ALBERTA POWER COMMISSION

1963 ANNUAL REPORT

GOVERNMENT OF THE PROVINCE OF ALBERTA

ANNUAL REPORT

OF THE

ALBERTA POWER COMMISSION

FOR THE YEAR ENDING

DECEMBER 31, 1963

EDMONTON

J. G. MacGREGOR

CHAIRMAN

4th February, 1964.

The Honourable A. Russell Patrick,
Minister of Industry and Development,
Legislative Building,
EDMONTON, Alberta.

Sir:

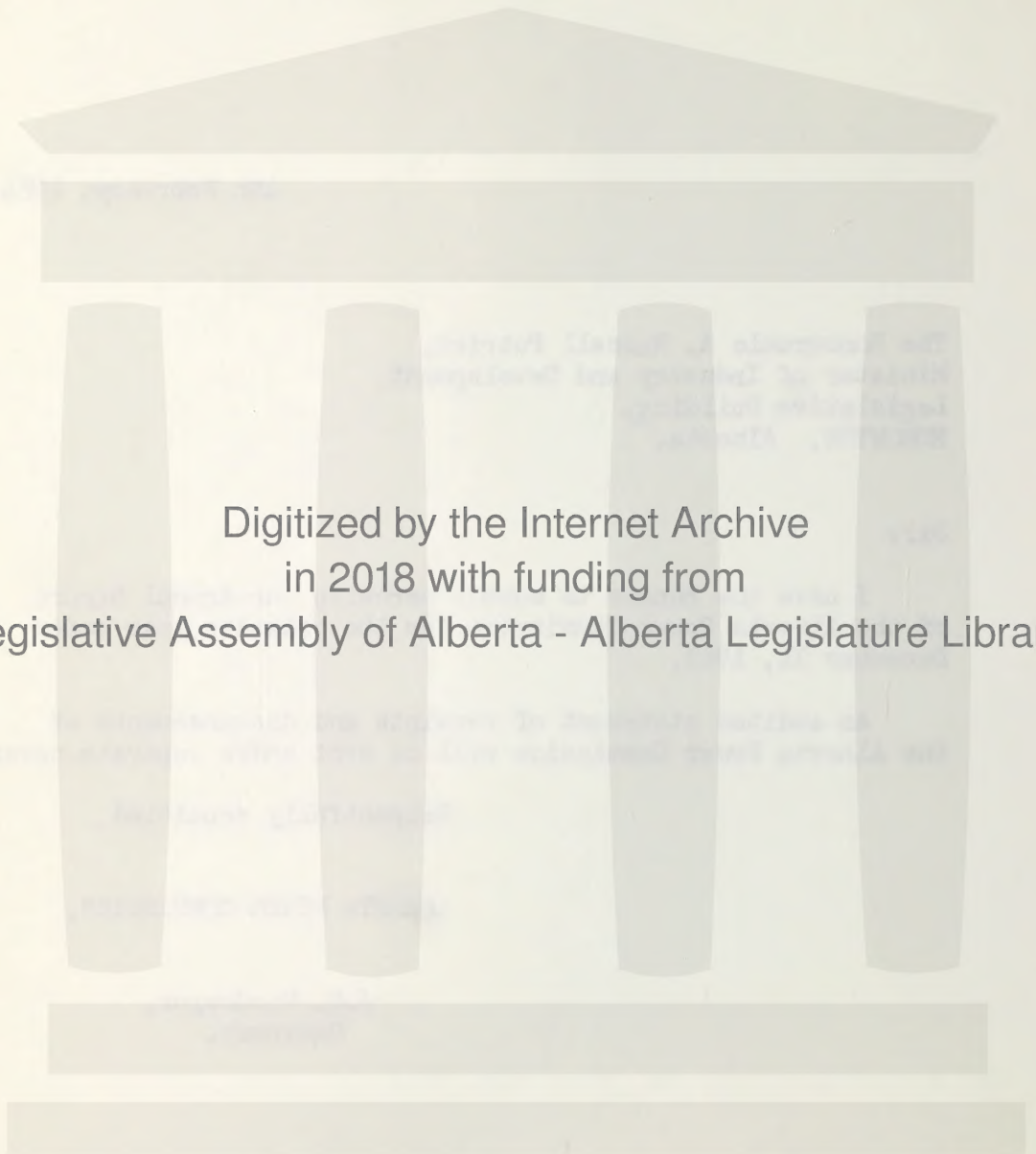
I have the honour to submit herewith the Annual Report of the Alberta Power Commission for the calendar year ended December 31, 1963.

An audited statement of receipts and disbursements of the Alberta Power Commission will be sent under separate cover.

Respectfully submitted,

ALBERTA POWER COMMISSION,

J.G. MacGregor,
Chairman.



ALBERTA POWER COMMISSION

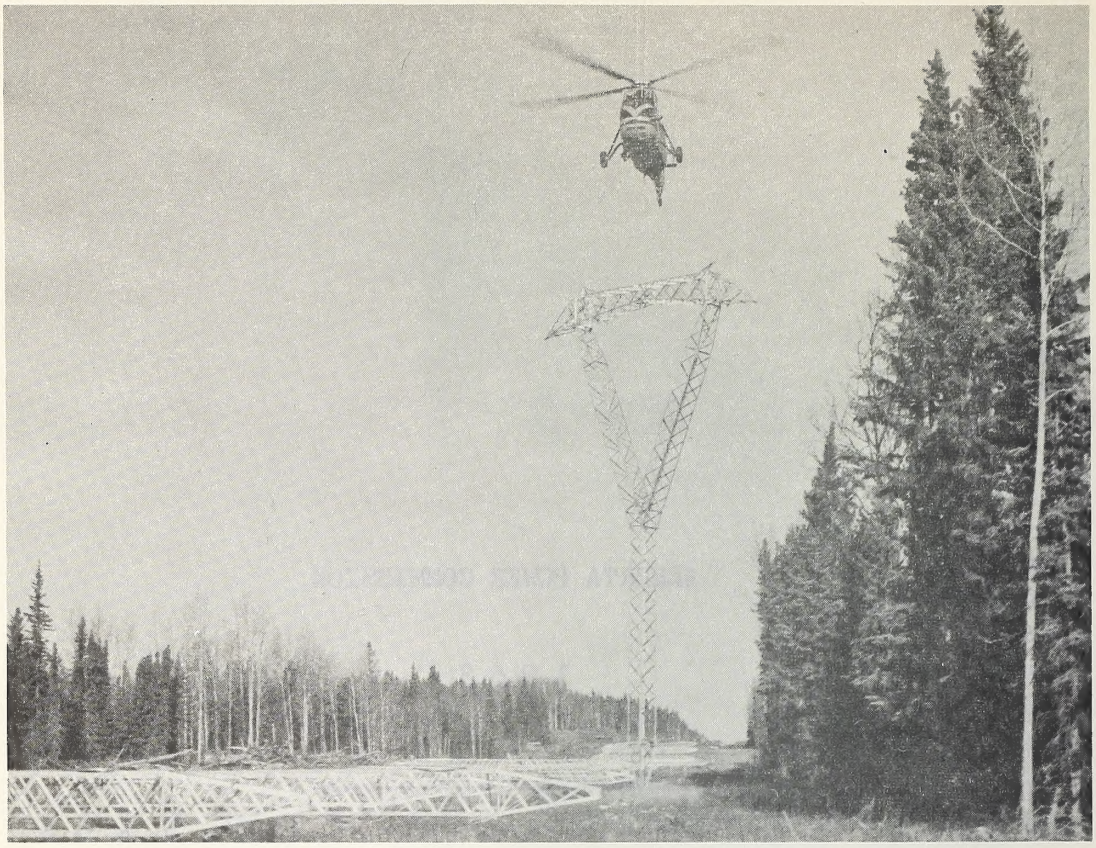
1963

J.G. MacGregor,
Chairman

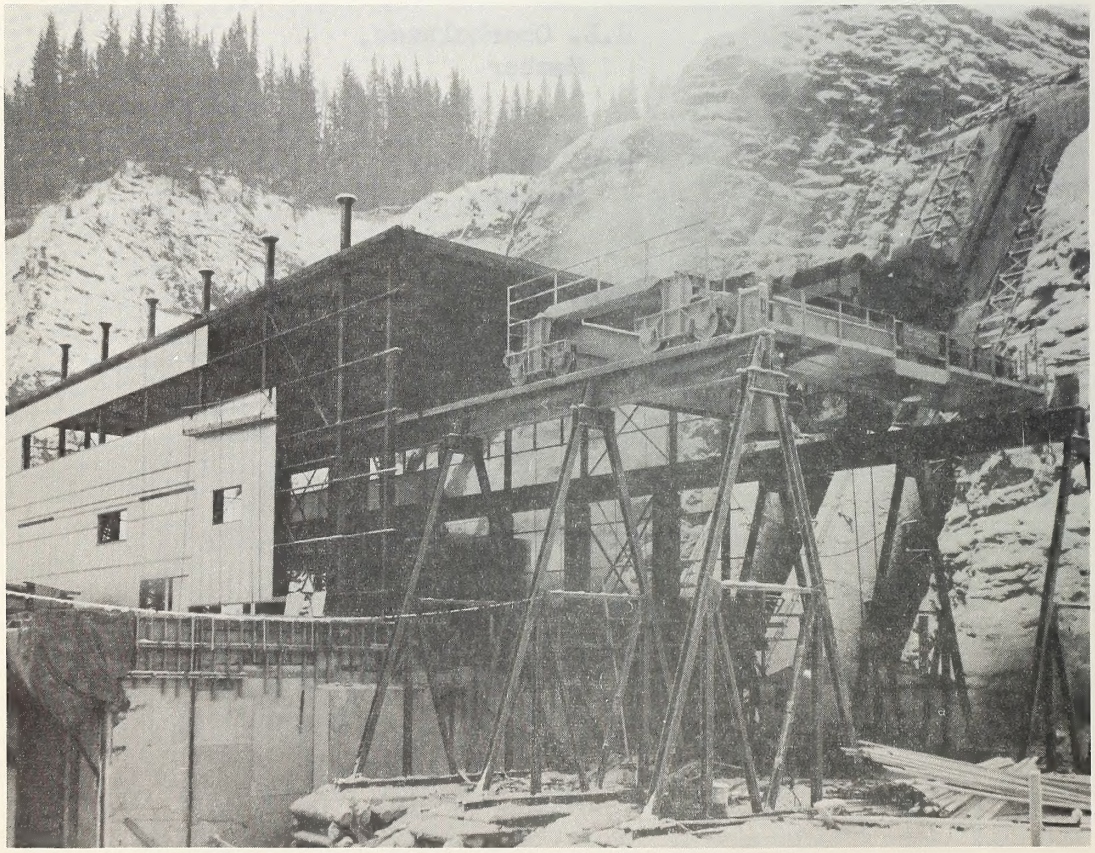
J.E. Oberholtzer,
Member

W.C. Whittaker,
Member

J.L. Reid,
Member
and Secretary



Helicopter makes a pick-up from an assembly site, of an aluminum-alloy transmission tower. Right-of-way, background, leads to the Big Bend hydro plant, on the Brazeau River, where a 200,000 h.p. unit will be commissioned in 1964.



By December, 1963, the Big Bend powerhouse was almost totally enclosed. Recently installed powerhouse crane can be seen in foreground. Installation of heavy generating machinery and electrical and supervisory equipment will continue to completion in September.

PREFACE

The Alberta Power Commission's duties, as set out under the Power Commission Act, are of a regulatory and supervisory nature. The Commission does not own or operate any power plants, transmission lines or distribution systems. In this respect it is different from the Power Commissions in all the other provinces except Prince Edward Island and Newfoundland. Its duties are largely covered by section 6 of the Power Commission Act, which is as follows:

"Whenever required so to do by the Lieutenant Governor in Council, the Commission shall inquire into, examine and investigate -

(a) water powers and water privileges in Alberta, their value and capacity;

(b) the existing facilities for the manufacture and distribution of power in Alberta;

(c) such other matters relating to power and its distribution in Alberta as the Lieutenant Governor in Council from time to time may require;

and shall report thereon to the Lieutenant Governor in Council."

The Commission feels that, at the present time, its principal duties are threefold:

1. The collection of statistics of the Electric Utility Industry in the Province, and the study of these statistics so that the people of the Province will have a true picture of the industry.
2. The study of hydro-electric sites and other power possibilities in the Province. The Commission also has been engaged in a study of the existing network of transmission lines in the Province with particular reference to more extensive interconnection which will ensure the most efficient

use of the large generating units which are already in operation and of those anticipated in the future.

3. Farm Electrification. This is a phase of its work to which the Commission has devoted much of its time. The main network of farm electrification lines is now practically completed. From here on, with very few exceptions, the additional farms to be electrified will be adjacent to existing lines. While the construction phase of farm electrification is almost over, problems of operating the farm lines are now taking much more time. The Commission is presently engaged in rather detailed studies of the deposit reserves of individual R.E.A.s.

ALBERTA POWER COMMISSION

ANNUAL REPORT

For Year Ending December 31st, 1963.

During 1963, Alberta's progress has continued to be most gratifying. Agriculture, mineral production, construction activity, manufacturing and the output of electricity have all presented a favourable picture. To keep pace with the growing industrialization of the province, new, large thermal and hydro generating installations are at various stages of completion and planning. The increase in K.W.H. generated over that of the previous year - a good indicator of economic conditions - has been 11%.

Traditionally, Alberta's economy has been based on agricultural production. During the past fifteen years, however, while its agriculture output has increased, the growth in mineral production and in the manufacturing industries has shot upward to the extent that agriculture now accounts for less than a quarter of the total net value of production. Today, agriculture, mining (including oil and natural gas), construction and manufacturing share almost equally in the total production. Since these four major industries each contribute more or less equally to the public welfare, the overall stability of the province's economy is assured, because it no longer has to depend upon the fluctuations in the single industry such as agriculture, which, in turn, is dependent on the variations of the weather from year to year. Even at that, it is encouraging to see that, dollar-wise, and especially this year, agriculture's contribution to the province's production is increasing. The value of manufactured shipments continues to increase year by year as new plants commence production and existing plants expand their operations.

In view of the foregoing, it is not surprising that, during the last decade outward signs of prosperity - paved and gravelled roads, vehicle registrations, use of electric power, etc., - have all shown increases well above the average Canadian rate.

The K.W.H. generated per capita - another good indicator - continues to increase. During the year, Alberta's population increased at about the usual rate and the K.W.H. generated per capita increased from 2750 to 2979. Ten years ago, in 1953, this per capita figure was 1338, so that the average person in Alberta is now using nearly two and one-half times as much electricity as he did ten years ago.

The increase in the use of electricity in Alberta during the past year is indicated by the following short summary. The figures compiled in it and throughout this report are confined to the Electric Utility Industry and are comparable to those presented by the Dominion Bureau of Statistics under the category of "Utilities".

K.W.H. Generated. The increase in K.W.H. generated over that of the previous year was 11.0%. Thermal plants generated 75.9% of the K.W.H. produced. Of this, internal combustion plants accounted for about the same proportion (3.1%) as they did during the previous year. This power, of course, is mainly that generated by Northland Utilities Limited and Canadian Utilities Limited in the Peace River country and includes the power generated by gas turbines at Valleyview.

Peak Load. The peak load for the Province has increased 11.2% over what it was in 1962. This increase is high, but this is due to comparing peak loads during a fall in which the weather was relatively severe with those of the previous year which was mild. If the weather in both years had been the same it is probable that the increase would have been of the order of 9%. The following figures are an estimate of the actual coincident peak for the Province:

System	Estimated Peak Load K.W., 1963
Interconnected system, including Athabasca, but less East Kootenay Power Co. (Includes Peace River interconnected system, 31,025 K.W.)	929,700
East Kootenay Power Co.	4,120
Canadian Utilities' Isolated Plants	1,035
Northland Utilities' Isolated Plants	2,764
	937,619
say,	937,500

Transmission lines in the Province increased by 734 miles to a total of 15,311, which includes 3,118 miles of Company-owned farm lines. Distribution line mileage increased to 5,819. The total mileage of all farm lines increased by 1,209 miles, so that the total farm mileage at the end of 1963 was 43,688. The total mileage of all power lines in the Province at the end of December, 1963, was 61,700.

The figures in Tables 1 to 8, which follow, are comparisons with the other Prairie Provinces and with Canada as a whole.

Table No. 1 shows the capacity in M.W. of the Utility Electric Stations in Canada for the past several years.

TABLE NO. 1

Capacity of Utility Electric Stations
M.W.

Year	Alberta	Canada	Saskatchewan	Manitoba
1951	280	9,724	272	457
1952	288	10,613	322	542
1953	372	11,687	347	561
1954	405	12,479	356	561
1955	477	13,422	394	637
1956	572	* 12,463	415	637
1957	596	13,444	452	644
1958	718	14,758	529	741
1959	750	16,937	670	757
1960	917	18,419	737	1,024
1961	947	19,492	754	1,063
1962	1,092			
1963	1,137			

Increase during the 10 year period ended 1961

Year	Alberta	Canada	Saskatchewan	Manitoba
1961	947	19,492	754	1,063
1951	280	9,724	272	457
Increase:	667	9,768	482	606
Percent Increase:	238%	100%	177%	133%

Increase Alberta: 1953 to 1963 - 206%

* In 1956, the D.B.S. changed its classification of statistics from Central Stations to Utilities.

Except for Alberta, the figures from 1951 to 1961 have been taken from D.B.S. publications. Alberta figures are those compiled by the Alberta Power Commission.

Table No. 2 shows the growth of K.W.H. generated net during the past several years.

TABLE NO. 2

Electric Energy Generated by Utilities
(Millions of K.W.H.)

Year	Alberta	Canada	Saskatchewan	Manitoba
1952	1,146	51,841	1,068	2,696
1953	1,298	53,340	1,161	2,791
1954	1,485	55,334	1,280	2,937
1955	1,707	61,642	1,409	3,102
1956	1,996	68,845	1,537	3,331
1957	2,249	71,522	1,678	3,341
1958	2,474	75,953	1,809	3,214
1959	2,830	83,049	1,998	3,598
1960	3,126	89,156	2,182	3,690
1961	3,451	89,389	2,422	3,786
1962	3,768	91,643	2,594	4,307
1963	* 4,186			

Increase during the 10 year period ended 1962

Year	Alberta	Canada	Saskatchewan	Manitoba
1962	3,768	91,643	2,594	4,307
1952	1,146	51,841	1,068	2,696
Increase:	2,622	39,802	1,526	1,611
Percent Increase:	229%	77%	143%	60%

Increase Alberta: 1953 to 1963 - 222.5%

* The figures from 1952 to 1962 have been taken from D.B.S. publications. 1963 figures for Alberta are those compiled by the Alberta Power Commission.

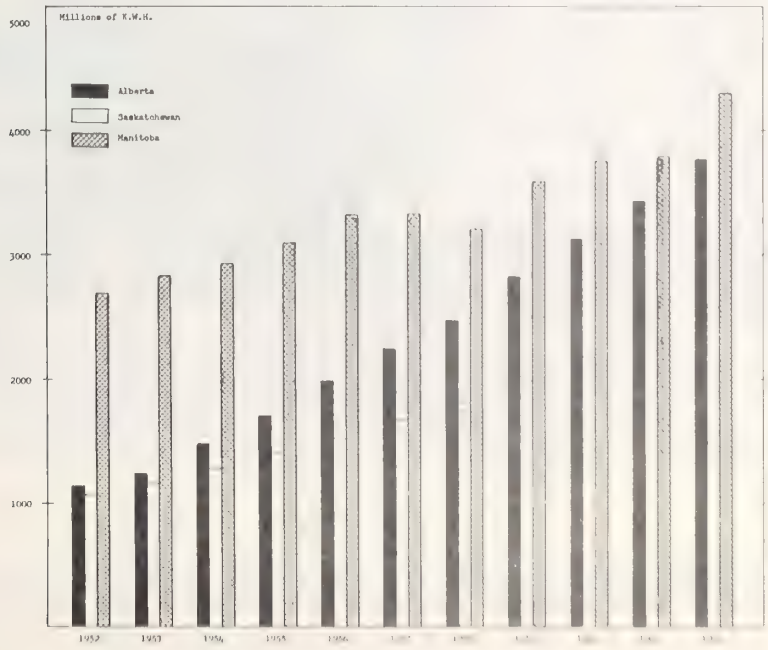


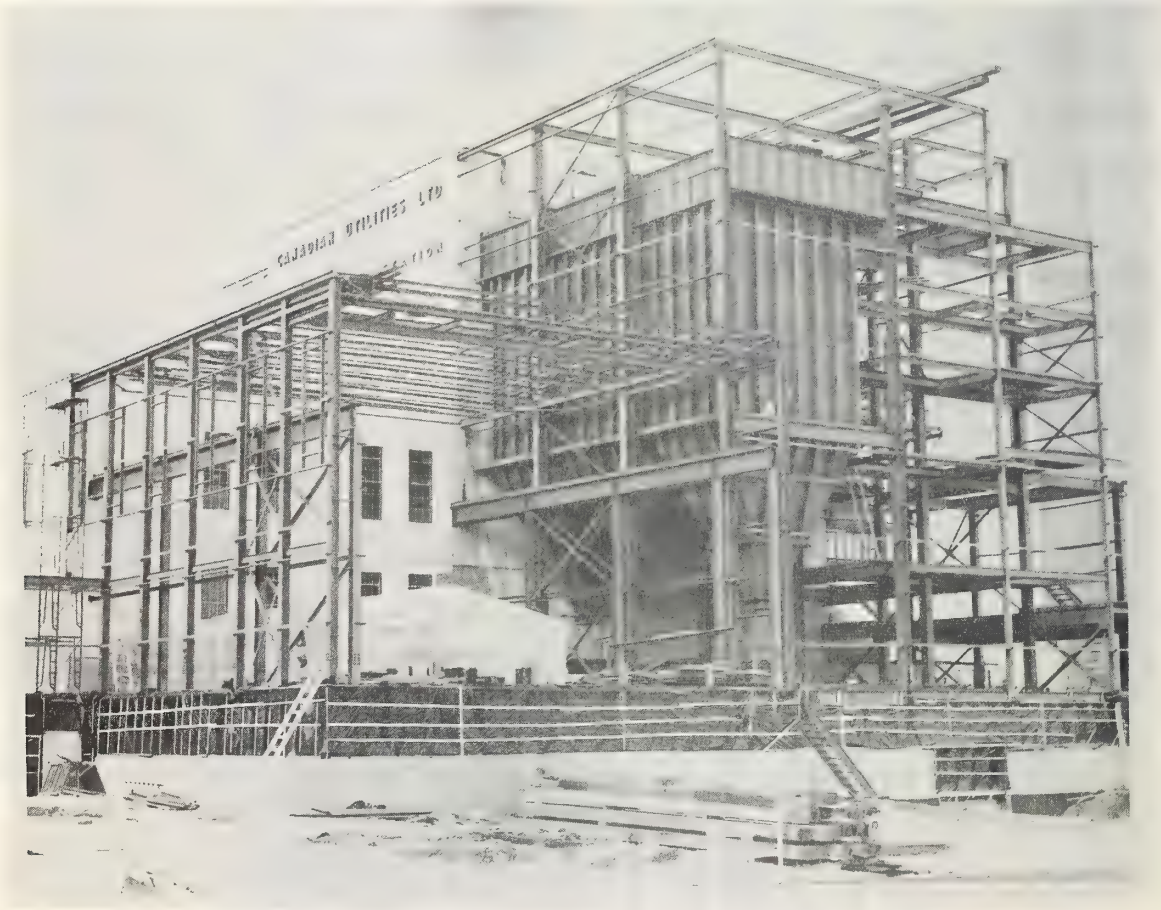
CHART 1 ELECTRIC ENERGY GENERATED BY UTILITIES
PRAIRIE PROVINCES 1952 to 1962

TABLE NO. 3

Annual K.W.H. used per Domestic and Farm Customer

Year	Alberta	Canada	Saskatchewan	Manitoba
1951	1,384	2,617	1,531	4,813
1952	1,473	2,809	1,677	4,868
1953	1,624	3,008	1,878	4,960
1954	1,865	3,271	2,072	5,229
1955	1,975	3,500	2,483	5,420
1956	2,256	3,740	2,361	5,636
1957	2,373	3,960	2,577	5,895
1958	2,532	4,128	2,696	6,113
1959	2,859	4,338	2,974	5,993
1960	2,989	4,490	3,019	6,184
1961	3,224	4,660	3,112	6,535

These are Dominion Bureau of Statistics figures.



The structural steel stage of the plant extension at Canadian Utilities' Battle River generating station, the capacity of which is being doubled to meet the ever-increasing demands for electric power in central and eastern Alberta.

TABLE NO. 4

Costs in Cents per K.W.H. Domestic and Farm Customers

Year	Alberta	Canada	Saskatchewan	Manitoba
1951	3.16	1.65	3.70	1.18
1952	3.06	1.65	3.59	1.21
1953	2.91	1.70	3.52	1.23
1954	2.75	1.69	3.39	1.25
1955	2.64	1.66	2.93	1.18
1956	2.51	1.64	3.17	1.15
1957	2.44	1.62	3.11	1.13
1958	2.40	1.61	3.08	1.06
1959	2.28	1.61	3.01	1.15
1960	2.22	1.60	2.98	1.16
1961	2.17	1.58	2.93	1.15

These are Dominion Bureau of Statistics figures.

TABLE NO. 5

Total Number of Customers of Utilities
(thousands)

Year	Alberta	Canada	Saskatchewan	Manitoba
1951	186	3,440	127	194
1952	200	3,621	139	209
1953	221	3,817	151	221
1954	239	4,002	170	234
1955	267	4,225	185	243
1956	276	4,412	206	254
1957	295	4,597	220	258
1958	316	4,798	230	267
1959	339	5,009	241	282
1960	355	5,178	256	287
1961	368	5,366	265	300
1962	* 382			
1963	* 397			

Increase during the ten-year period ending 1961

Year	Alberta	Canada	Saskatchewan	Manitoba
1961	368	5,366	265	300
1951	186	3,440	127	194
Increase:	182	1,926	138	106
Percent Increase:	98%	56%	109%	55%

Increase Alberta: 1953 to 1963 - 80%

* Figures marked thus are Alberta Power Commission figures, and others are from the Dominion Bureau of Statistics.

TABLE NO. 6

Number of Farms Served by Utilities as at December 31 each year

Year	* Alberta	Saskatchewan	Manitoba
1951	13,479	5,594	23,777
1952	18,055	8,591	29,623
1953	24,181	13,850	33,601
1954	30,504	21,287	37,422
1955	34,768	28,993	38,277
1956	37,658	33,195	38,091
1957	41,130	44,955	38,120
1958	45,848	50,813	38,700
1959	49,923	55,424	39,027
1960	53,151	59,384	39,162
1961	55,768	62,260	39,326
1962	58,593		
1963	61,340		

TABLE NO. 7

Consumption in K.W.H. per Farm per Year

Year	Alberta	Canada	Saskatchewan	Manitoba
1951	2,461	2,085	1,266	2,475
1952	2,747	2,228	1,527	2,666
1953	2,604	2,420	1,915	2,943
1954	2,958	2,672	2,053	3,541
1955	2,882	2,803	2,054	3,564
1956	3,255	3,060	2,217	3,911
1957	3,297	3,415	2,490	4,238
1958	3,566	3,686	2,670	4,586
1959	3,956	4,086	3,180	5,366
1960	4,029	4,345	3,315	5,523
1961	4,404	4,654	3,537	5,995
1962	* 4,769			
1963	* 4,953			

* Figures marked thus are Alberta Power Commission figures, and others are from the Dominion Bureau of Statistics.

TABLE NO. 8

Total Pole Line Mileage
(Includes transmission, distribution and rural lines)

Year	Alberta	Canada	Saskatchewan	Manitoba
1951	15,125	170,582	9,574	24,439
1952	20,188	190,316	13,858	28,514
1953	26,211	213,176	20,899	32,237
1954	* 31,736	228,158	26,177	33,615
1955	* 36,233	243,773	33,755	33,219
1956	* 39,430	265,389	44,516	34,232
1957	* 43,404	285,306	54,700	34,317
1958	* 48,721	311,511	58,852	35,111
1959	* 52,368	310,840	64,495	35,302
1960	* 54,821	320,618	66,856	35,457
1961	* 57,113	330,313	69,005	34,652
1962	* 59,777			
1963	* 61,700			

* Figures marked thus are Alberta Power Commission figures; the others are from the Dominion Bureau of Statistics.

TABLE NO. 9

K.W.H. Generated per Capita in Alberta

Year	Population	K.W.H. Generated x 10^6	K.W.H. Generated/ Capita
1953	1,002,000	1,341	1,338
1954	1,039,000	1,499	1,443
1955	1,066,000	1,728	1,621
1956	1,123,000	2,019	1,798
1957	1,160,000	2,243	1,934
1958	1,201,000	2,474	2,060
1959	1,243,000	2,830	2,277
1960	1,283,000	3,126	2,436
1961	1,332,000	3,446	2.587
1962	1,370,000	3,768	2,750
1963	1,405,000	4,186	2,979

PRESENT STATUS OF THE INDUSTRY

The Statistics for the Electric Utilities for the year 1963 follow: Some of the minor figures are estimates only, due to the fact that the report has to be prepared before the various utilities have completed their statistics for the past year. These minor estimates will not be in error by more than 1% or 2%, so that the error in the whole will be negligible.

Tables No. 10 to 20 deal with plant capacity, peak load and K.W.H. generated. They break up the figures to show what was generated by hydro, steam and internal combustion engines, and also to show the proportions generated by the publicly-owned and the privately-owned plants. Table No. 16 gives further details of the generating plants and their output. It will be noted that it is divided into three groups, A, B, and C.

The largest, Group A, contains those power plants which are connected by transmission lines, so that we speak of them as being in the interconnected system. This group, which covers most of the Province, includes towns served by Calgary Power Ltd., Canadian Utilities Limited (excluding areas shown under B. and C.), the Athabasca system of Northland Utilities Limited, the Cities of Edmonton, Calgary, Lethbridge, Red Deer and Medicine Hat, and the Towns of Ponoka, Fort Macleod and Cardston. Some of these do not generate their own power but purchase it from Calgary Power Ltd., and retail it to their inhabitants. This group includes the hydro plants of Calgary Power Ltd., which are rated as follows:

TABLE NO. 10

Plant	Capacity	
	Gross H.P.	Net K.W.
Pocaterra -	18,500	14,900
Interlakes -	6,900	5,000
Rundle -	63,000	49,900
Spray -	124,000	102,800
Three Sisters -	3,600	3,000
Cascade -	46,000	35,900
Horseshoe -	20,000	13,900
Kananaskis -	24,000	18,900
Barrier -	16,000	12,900
Ghost -	67,450	50,900
Bearspaw -	22,000	16,900
	411,450	325,000

The rating of the major thermal plants in Groups A. and B. is as follows:

TABLE NO. 11

Plant	Fuel	Net K.W. Rating
Calgary Power Ltd.		
Wabamun	Gas	136,000
Wabamun	Coal	147,000
Canadian Utilities Ltd.		
Battle River	Coal	33,000
Drumheller	Coal	17,500
* Vermilion	Gas	39,000
* Sturgeon	Gas	18,500
** Fairview	Gas	11,200
* City of Edmonton	Gas	315,000
* City of Lethbridge	Gas	30,700
City of Medicine Hat	Gas	40,500
East Kootenay Power Co.	Coal	10,000

* Includes Gas Turbines.
** Jointly owned by Canadian Utilities Limited and Northland Utilities Limited.

Group B. takes in the Peace River country and includes the territory served by Canadian Utilities Limited and Northland Utilities Limited. The systems of these companies are tied together by transmission lines from Fairview to Rycroft and from Valleyview to High Prairie, so that now the whole of the Peace River country is one interconnected system. At Judy Creek there is, moreover, a small interconnection between the main interconnected system and that of the Peace River country. During 1964, a major connection will be made by a line from Whitecourt to Valleyview.

Group C. includes various isolated towns served either by Northland Utilities Limited or by Canadian Utilities Limited.

In 1963, the interconnected system shown as Group A., had a combined capacity of 1,095,500 K.W., and generated 4,053,986,000 K.W.H. It served 377,842 customers. This system accounts for 96% of the generating capacity of the Province, 97% of the K.W.H. generated, and 95% of the number of customers.

The Peace River country interconnected system shown as Group B., had a combined capacity of 33,700 K.W. and generated 114,493,000 K.W.H., and served 17,798 customers.

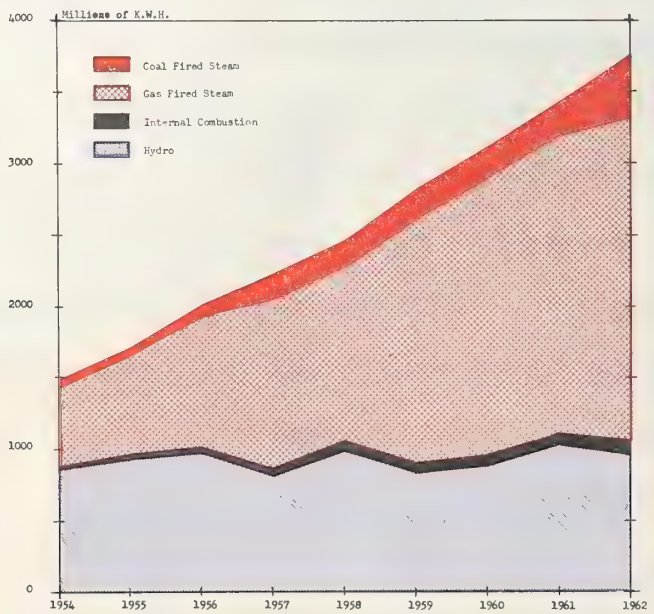


CHART NO. 2 ELECTRIC ENERGY GENERATED IN ALBERTA
1954-1962 BY SOURCES OF ENERGY

TABLE NO. 12

The following Companies or Municipalities provide Central Station Electrical Service in the Province. This table gives preliminary data as to their plant capacity, their loads, and the K.W.H. they generated (net) in 1963.

Privately Owned

Name of Company	Plant Capacity Dec. 31/63 Net K.W.	Peak Load (KW) on plants during 1963	K.W.H. Gen. Net - 1963 (thousands)
Calgary Power Ltd.	608,000	594,900	2,422,466
Canadian Utilities Ltd.	114,475 (1)	106,140	437,667 (2)
Northland Utilities Ltd.	18,494	16,849	41,344
East Kootenay Power Co. Ltd. (3)	10,000	10,000	11,291
	750,969		2,912,768

Publicly Owned

Name of Municipality			
City of Edmonton	315,000	200,000	916,228
City of Lethbridge	30,700	19,900	92,080
City of Medicine Hat	40,500	38,300	265,090 (4)
	386,200		1,273,398
TOTAL:	1,137,169		4,186,166

(1) Includes one 1,200 K.W. unit at Fairview.

(2) Includes some K.W.H. generated at Fairview.

(3) The East Kootenay Power plant is located at Sentinel some two or three miles inside the Alberta border. While this energy is generated in Alberta, most of it is exported to British Columbia.

(4) Includes 148,979,400 K.W.H. sold to Calgary Power Ltd.

TABLE NO. 13

The following is a re-arrangement of the figures in Table 12, so as to break them down into power generated by hydro, steam and internal combustion plants. Some of the thermal plants include gas turbines.

HYDRO

Name of Company	Plant Capacity December 31/63 K.W. (Net)	Peak Load (KW) on plants during 1963	K.W.H. Gen. Net - 1963 (thousands)
Calgary Power Ltd.	325,000	316,300	875,468
Northland Utilities Ltd.	1,432	860	5,699
Total Hydro:	326,432		881,167

STEAM

Calgary Power Ltd.	283,000	278,600	1,546,989
Canadian Utilities Ltd. (5)	89,500	86,500	345,572
East Kootenay Power Co. Ltd. (3)	10,000	10,000	11,291
City of Edmonton (5)	315,000	200,000	916,228
City of Lethbridge (5)	30,700	19,900	92,080
City of Medicine Hat	40,500	38,300	265,090 (4)
Total Steam:	768,700		3,177,250

INTERNAL COMBUSTION

Calgary Power Ltd.	-	-	9
Canadian Utilities Ltd. (5)	24,975 (1)	19,640	92,095 (2)
Northland Utilities Ltd.	17,062	15,989	35,645
Total Internal Combustion:	42,037		127,749
GRAND TOTAL:	1,137,169		4,186,166

(1) Includes 1,200 K.W. unit at Fairview

(2) Includes some K.W.H. generated at Fairview

(3) See footnote (3) on Table No. 12

(4) Includes 148,979,400 K.W.H. sold to Calgary Power Ltd.

(5) Includes Gas Turbines.

TABLE NO. 14

The following table may be of interest as showing the relative percentages of capacity and generation as set out in the foregoing tables.

Method of Generation	% of Capacity	% of Power Generated
Hydro	28.7	21.0
Steam & Gas Turbine	67.6	75.9
Internal Combustion	3.7	3.1
	100	100
Publicly owned	34.0	30.4
Privately owned	66.0	69.6
	100	100

TABLE NO. 15

The following is a breakdown of the fuel used in larger thermal plants during 1962

	Gas M.C.F.	Oil Gallons	Coal Tons
Calgary Power Ltd.			
Wabamun	11,803,131	-	140,150
Canadian Utilities Ltd.			
Drumheller	-	-	67,521
Battle River	-	-	144,535
Vermilion	306,487	626,747	
Valleyview	1,283,427	-	
Grande Prairie	4,012	898	
Miscellaneous	-	238,248	
Northland Utilities Ltd.			
Fairview	267,546	2,221	
Miscellaneous	102,421	255,670	
City of Edmonton	10,196,045	2,961,866	
City of Lethbridge	1,613,969		
City of Medicine Hat	5,459,127		
	31,036,165	4,085,650	352,206

TABLE NO. 16

SUMMARY OF GENERATING PLANTS IN ALBERTA

AS AT DECEMBER 31, 1963

Owner	Hydro		Steam		Internal Combustion	
	K.W. Rating (Net)	Net K.W.H. generated 1963 (thousands)	K.W. Rating (Net)	Net K.W.H. generated 1963 (thousands)	K.W. Rating (Net)	Net K.W.H. generated 1963 (thousands)
A. Within the interconnected system						
Calgary Power Ltd. (only)	325,000	875,468	283,000	1,546,989	—	9
Canadian Utilities Ltd.			89,500 (1)	345,572 (1)		
East Kootenay Power Co. Ltd.			10,000	11,291		
City of Edmonton			315,000 (1)	916,228 (1)		
City of Lethbridge			30,700 (1)	92,080 (1)		
Athabasca System (N.U.L.)					1,800	1,259
City of Medicine Hat			40,500	265,090		
TOTAL GROUP A:	325,000	875,468	768,700	3,177,250	1,800	1,268
B. Peace River Interconnected System						
Canadian Utilities Ltd.					23,500 (1)	88,962 (1)
Northland Utilities Ltd.					10,200	25,531
TOTAL GROUP B:					33,700	114,493
C. Isolated Systems						
Northland Utilities Ltd.						
Jasper	1,432	5,699			2,190	2,375
Worsley					1,514	1,677
Misc. Small Plants					1,358	4,803
Canadian Utilities Ltd.						
McMurray					550	1,655
Smith					450	714
Misc. Small Plants					475	764
TOTAL GROUP C:	1,432	5,699			6,537	11,988
TOTAL ALL GROUPS:	326,432	881,167	768,700	3,177,250	42,037	127,749
		GRAND TOTAL:	1,137,169	4,186,166		

(1) Includes gas turbines.

TABLE NO. 17

Total Circuit Miles of Transmission Lines in the Province by Regional Groups as at December 31, 1963. This includes Company-owned Farm Lines, but does not include the Co-operative-owned Farm Lines.

	VOLTAGE			
	2,300 to 22,000 V	33,000 V to 72,000 V	132,000 V & greater	Total
A. Within the Interconnected System				
Calgary Power Ltd.	8,073	1,290	1,701	11,064
Canadian Utilities Ltd.	1,730	837	143	2,710
City of Medicine Hat	34			34
East Kootenay Power Co. Ltd.	35	50		85
Athabasca System	69			69
Total Group A:	9,941	2,177	1,844	13,962
B. Systems within the Peace River country				
Canadian Utilities Ltd.	374	254		628
Northland Utilities Ltd.	484	152		636
Total Group B:	858	406		1,264
C. Isolated Towns				
Northland Utilities Ltd.				
Jasper	29			29
Worsley	1			1
Other Areas	48			48
Canadian Utilities Ltd.				
McMurray	7			7
Total Group C:	85			85
TOTAL ALL GROUPS:	10,884	2,583	1,844	15,311

TABLE NO. 18

SUMMARY OF DISTRIBUTION SYSTEMS IN ALBERTA

As at December 31, 1963.

	Total Number of Customers Served (Includes Rurals)	K.W.H. Sold (Less Sales to other Cos.) (thousands) (Includes Rurals)	Circuit Miles of Line (Excludes Rurals)
A. Within the Interconnected System			
Calgary Power Ltd.	125,350	1,427,000	2,055
Canadian Utilities Ltd.	39,310	239,822	682
East Kootenay Power Co. Ltd. (1)	1,289	15,552	35
City of Edmonton	85,630	761,951	827
City of Calgary	93,348	811,311	1,064
City of Lethbridge	11,983	81,746	138
City of Medicine Hat	8,878	116,111	116
City of Red Deer	6,533	50,201	126
Town of Cardston	1,017	3,664	34
Town of Fort Macleod	965	4,030	21
Town of Ponoka	1,529	8,121	25
Athabasca System	2,010	8,034	63
TOTAL GROUP A:	377,842	3,527,543	5,186
B. Systems Within the Peace River			
Canadian Utilities Ltd.	9,678	59,819	346
Northland Utilities Ltd., including High Prairie, McLennan, Valleyview and Manning	8,120	34,395	195
TOTAL GROUP B:	17,798	94,214	541
C. Isolated Towns			
Northland Utilities Ltd.			
Jasper	835	6,603	29
Worsley	42	1,356	1
Misc. Small Plants	318	1,536	28
Canadian Utilities Ltd.			
McMurray	347	1,495	11
Smith	102	582	3
Misc. Small Plants	166	726	20
TOTAL GROUP C:	1,810	12,298	92
G R A N D T O T A L:	397,450	3,634,055	5,819

(1) Includes Towns of Coleman, Frank, Cowley, etc.

TABLE NO. 19

SUMMARY OF RURAL ELECTRIFICATION SYSTEMS IN ALBERTA

As at December 31, 1963.

	Number Farmers Served	Number Non-Farmers Served	Total Number Customers	Circuit Miles of Line
A. Within the Interconnected System				
Calgary Power Ltd.				
Experimental Areas and Individual Rurals (1)	4,287	1,049	5,336	2,481
R.E.A.s	37,354	6,724	44,578	25,555
Canadian Utilities Limited				
Experimental Areas and Individual Rurals (1)	765	110	875	427
R.E.A.s	11,866	959	12,825	10,176
Northland Utilities Limited - Athabasca System				
Experimental Areas and Individual Rurals (1)	4	-	4	2
R.E.A.s	815	55	870	672
East Kootenay Power Co. Ltd.				
R.E.A.s and Lundbreck Co-op.	164	58	222	158
Adjacent to Cities, etc. (1)	254	-	254	96
TOTAL GROUP A:	56,009	8,955	64,964	39,567
B. Peace River Country				
Canadian Utilities Limited				
Experimental Areas and Individual Rurals (1)	125	99	224	87
R.E.A.s	2,727	153	2,880	2,092
Northland Utilities Limited				
Experimental Areas and Individual Rurals (1)	125	-	125	24
R.E.A.s	2,295	207	2,502	1,839
TOTAL GROUP B:	5,272	459	5,731	4,042
C. Isolated Towns Served by Northland Utilities Limited				
Company-owned Rurals (1)	1	-	1	1
R.E.A.s	58	14	72	78
TOTAL GROUP C:	59	14	73	79
GRAND TOTAL:	61,340	9,428	70,768	43,688

(1) The lines to serve these farms are the property of the Power Companies. This mileage is also included in the table showing transmission lines under the heading of 2,300 to 22,000 volt lines, etc.

TABLE NO. 20

DATA RE. CENTRAL STATIONS IN ALBERTA BY REGIONAL GROUPS
As at December 31, 1963.

	Group A	Group B	Group C	Total
Plants				
K.W. Rating	1,095,500	33,700	7,969	1,137,169
K.W.H. Generated (Thousands)	4,053,986	114,493	17,687	4,186,166
Transmission				
Miles of Line	13,962	1,264	85	15,311
Distribution				
Number of customers	377,842	17,798	1,810	397,450
K.W.H. sold (Thousands)	3,527,543	94,214	12,298	3,634,055
Miles of Line	5,186	541	92	5,819
Rural				
Number of farms (1)	56,009	5,272	59	61,340
Number of non-farms (1)	8,955	459	14	9,428
Miles of farm line (2)	39,567	4,042	79	43,688
Miles of R.E.A. line (3)	36,561	3,931	78	40,570

(1) Included in Number of Customers shown under Distribution.

(2) Partly included in Miles of Transmission Lines.

(3) Not included in Miles of Line shown under Distribution or Transmission Lines.

The following is a more detailed summary of the additions to generating capacity, transmission line facilities, etc., during the year 1963:

Calgary Power Ltd.

(1) Changes in Plant Capacity

Work is continuing on the Brazeau Storage and Power Development. The initial development consists of a storage reservoir of some 275,000 acre-feet capacity which was completed in the fall of 1962 and a powerhouse containing an initial unit of 150,000 kilowatts scheduled for operation in the fall of 1964.

(2) Additional Transmission Lines

During the year 1963 Calgary Power Ltd. built the following transmission lines:

Camrose	138 KV	2.67 miles	
Rimbey	138 KV	20.23 "	
Sedgewick to Hardisty	138 KV	22.32 "	
Medicine Hat to Empress Gas Plant	138 KV	55.68 "	(operates at 23 KV)
Stavely	138 KV	10.0 "	
Medicine Hat to Burdett	138 KV	47.53 "	(Medicine Hat to Bow Island section) (now operating at 138 KV)
Banff to Lake Louise	34.5 KV	33.54 "	
Picture Butte	23 KV	10.28 "	

New substations and substation changes during 1963 were as follows:

Co-ordination of C.P. Ltd. East Calgary substation with the new City of Calgary #2 substation has been effected. Switching for the East Calgary 51L to West Calgary and 150L to the Ghost Plant has been re-installed in the City's bus structure, as also have two 15,000 KVA 138/13.2 KV transformers. The 13 KV switching for the City's feeders has been replaced by new metalclad

switchgear. The 138/13.2 KV transformer capacity has been increased from 30,000 KVA to 54,000 KVA.

138 KV Oil Circuit Breakers were installed on 80L (Ghost-Edmonton) on the N. and S. sides of the Olds and Wetaskiwin substations.

A 20,000 KVA 138/23.9 KV substation was commissioned at Calder, near Edmonton, replacing former 69/23.9 KV facilities.

A 10,000 KVA 138/69/23.9 KV substation was established near Rimbey, now operated at 69 KV, this station will later be operated at 138 KV.

A 10,000 KVA 138/23.9 KV substation was established at Stavely.

A 7,500 KVA 138/23.9 KV substation was established at Burdett.

A 10,000 KVA 138/23.9 KV substation was established north of Lethbridge. This substation is provided with 138 KV circuit breakers in lines to Fort Macleod and Burdett, a 10,000 KVA throughput 23.9 KV regulator and switching for four 23.9 KV feeders. This substation will later be controlled from the City of Lethbridge Power Plant.

Nearing completion (Jan. 1964) is the installation of a 30/40 MVA 125 $\pm$ 15%/13.8 KV regulating transformer at Medicine Hat substation. 138 KV circuit breakers have been installed in lines to Calgary and Burdett. A 6,000 KVA 13.2/69 KV transformer and switching for a 69 KV line to Empress have been installed together with a 10,000 KVAR Capacitor Bank and rearrangement of 13.2 KV switchgear.

A 5,000 KVA 69/23.9 KV substation was established at Boyle.

A 5,000 KVA 69/4.16 KV substation was established to serve Interprovincial Pipe Line near Hardisty.

A 5,000 KVA 69/4.16 KV addition was made to the Inland Cement substation near Edmonton.

A 1,500 KVA 69/23.9 KV transformer was added to the Eckville substation, 534S.

A 6,000 KVA 69/23.9 KV substation is nearly completed near Empress.

138 KV switchgear has been installed in the Fort Macleod line at Blackie.

69 KV switchgear has been installed in 201. at Irricana.

69 KV switchgear has been installed at Whitecourt.

23.9 KV voltage regulator capacity at Olds has been increased from 7.5 MVA throughput to 15 MVA throughput.

A 20,000 KVA 23.9 KV throughput voltage regulator has been installed at Jasper Place 272S.

A 15,000 KVA 69 KV throughput voltage regulator has been installed at Sedgewick together with 69 KV switchgear, metering, etc.

A new 240 KV substation is under construction near Benalto. This sub-station will be the main intermediate switching station for the Wabamun and Big Bend to Calgary transmission and will be commissioned in 1964.

(3) During the year 1963, Calgary Power Ltd. extended its service to:

Lake Louise

Long Lake (near Boyle)

Cochrane Lake (Near Cochrane)

Caslan (near Boyle)

Street Lights

Approximately 1,200 new Mercury Vapour street lights will have been added to Calgary Power's system during 1963 and 80 incandescent fixtures removed.

Oilfields

Main activity this year continued to be Pembina and Keystone Fields and an extention was made to the Bashaw Field for 16 pumping services. A total of 573 new oilfield services were added, representing 8,200 HP (well pumps, gathering systems, water systems and miscellaneous) but disconnected 283 oilfield services representing 5,037 HP which were no longer required. There

are now a total of 6,850 oilfield services - 4,505 oilwell pumps, 969 for gathering systems, 524 for water pumping and injection systems and 860 miscellaneous services.

Approximately 8,000 HP in oil pump stations was connected during the year, including 2 - 2000 HP units near Hardisty. A pipe line from Lloydminster, through Wainwright to Hardisty, including the injection station at Hardisty, represented well over 2,000 HP.

Arrangements have been made to serve approximately 4,000 HP in gas plants, the largest of these being approximately 2,500 HP at a plant near Empress, which it is anticipated will come on the line early next year.

The 2,500 KVA pipe mill in Camrose is now operating. The new terminal building at the Edmonton International Airport is taking service and this load will probably start at around 1,500 KW and can easily grow to 2 or 3 times that figure. A plywood plant is now in operation in the Fort Macleod Industrial Subdivision, with a load of about 250 KVA. At Carson Lake, north of Whitecourt, a 700 HP water pump is in operation in connection with a water flood of the Judy Creek oilfield.

Services to feed mills, water treating and pumping plants, ice arenas and curling rinks, schools, irrigation pumps and light manufacturing plants continue to be connected. A 100 HP water pump was connected at Pigeon Mountain in connection with a large snow making installation there.

Canadian Utilities, Limited

(1) Work progressed on schedule on the second 32,000 K.W. steam turbine at Battle River. The initial steaming date has been set for April 1st, with a commissioning date of June 1st, 1964.

(2) During 1963, expenditures on transmission lines and substations totalled $600,000.

(a) Transmission Lines.

The company completed the first of two lines connecting the Peace River country to the provincial grid with a 72 KV line from Sarah Lake to the South. On the second tie line, crews built approximately 25 miles of a 55 mile, 138 KV line from Fox Creek to Valleyview, scheduled for completion by August 1st, 1964. The company built 32 miles of 69 KV line from Castor to Veteran; made major improvements in the Byemoor-Endiang district; and converted 24 miles of line from Wanham to Eaglesham to three phase.

(b) Substations.

The Mercer Hill substation capacity was doubled to 12,000 K.V.A. and a new 3,000 K.V.A. distribution substation was built in Grande Prairie. Major revisions were completed at the Drumheller Plant substation and a conversion to 138 KV at the Battle River Plant was underway. A new 3000 K.V.A. substation was completed at Veteran, and the St. Paul Substation capacity was increased to 3,000 K.V.A. Additional capacity totalling 5,000 K.V.A. was installed at the Bonnyville and Hanna substations.

(3) Services to Oilfields, New Industries, etc.

During 1963, company expenditures totalled approximately $200,000 for oilfield extensions to provide service to 110 new oilfield customers, mainly in the Swan Hills and Drumheller areas.

Two new pipeline pumping loads at Lloydminster and three new gas plants in the Drumheller area totalled 1,500 H.P. The company provided service to the Judy Creek Gas Plant with an 800 H.P. load; the Grande Prairie City Wapiti water plant with 250 H.P.; five microwave sites at Boland, Earlie, Lavoy, Mannville and Valhalla, totalling 150 H.P.; and three new vocational school loads at Drumheller, Grande Prairie and Stettler, totalling 600 H.P.

Northland Utilities, Limited

(1) Changes in Plant Capacity

At Worsley, the 1500 K.W. plant was commissioned in April. A 200 K.W. unit was added to the Fort Vermilion plant, and a new building was erected at High Level; the capacity there was increased by 80 K.W. A 50 K.W. installation was made to supply the Overlander premises and a similar size installation was made at Atikameg. Some changes were made at the Microwave sites, to bolster their capacity by an additional 115 K.W. Northland also purchased the distribution system at the settlement of La Crete, and installed a trailer mounted plant with a capacity of 50 K.W., at that point. The plant at Lac La Biche was dismantled, as that area was tied in to the transmission grid system.

(2) Additional Transmission Lines and Substations

(a) The following additions were made to Northland Utilities' transmission lines:

3 miles - 3 phase - 25 KV - from the Worsley plant.
14 miles - 2 phase - 25 KV - Paddle Prairie to Keg River.
9 miles - 1 phase - 14.4 KV - Atikameg to Gift Lake.
4 miles - 1 phase - 14.4 KV - In the Paddle Prairie area.
13 miles - 1 phase - 7.2 KV - Fort Vermilion to Rocky Lane.

(b) A 6000 K.V.A. transformer installation was made at the Wagstaff substation, and an existing 2000 K.V.A. was removed from Wagstaff and relocated in the Triangle substation.

City of Edmonton

Changes in Plant Capacity

A steam turbine, having a net capacity of 72,000 K.W., was installed during the year and plans are going forward for another similar unit, to be installed during 1966.

City of Lethbridge

Changes in Plant Capacity

No changes have taken place during 1963.

In general, considerable substation and transmission capacity has been added during the year to keep pace with the remarkable growth of load in the main interconnected system and in the Peace River country. Considerable growth has been experienced in the oilfields in the Swan Hills and associated areas.

From its Valleyview plant, Canadian Utilities Limited supplies some light loads for some 60 miles south and east along the highway. Calgary Power Limited has built a 23 K.V. transmission line from Whitecourt to the Windfall gas field and for some 15 miles this follows Highway No. 43. The effect of these lines is a start towards closing the gap between the Peace River country and the main Provincial interconnected system. Moreover, a Canadian Utilities Limited 69/23 K.V. line runs east from its Valleyview plant into the Swan Hills. Similarly, Calgary Power Limited has a 69/23 K.V. line running north from Whitecourt to the Judy Creek area. Although these lines are connected, they are too light to be capable of transferring any major quantity of power between the interconnected system in the Peace River country and that in the rest of the province. They do, however, ensure more reliable service in the area.

It is planned that a large interconnecting line will be built by the fall of 1964 to tie the Peace River country and the main interconnected system together; Calgary Power Ltd. will build a 132 K.V. line to some point near Two Creeks and Canadian Utilities will build from its Valleyview plant to that point.

The next logical step in the development of power in the Peace River country might be the construction of one relatively large thermal station which, in conjunction with the tie line mentioned above, would supply the load in that area, leaving the existing plants to take care of peak load. One of the difficulties of building a large thermal station in the Peace River country

has been the lack of coal in that area and the lack of a gas field large enough to provide fuel for such a plant for an extended period.

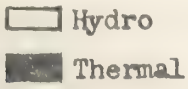
It appears now, however, that such a fuel supply is available at Worsley. Northland Utilities' is already utilizing it and has built a small internal combustion engine plant there. Present plans are to enlarge this plant, possibly by installing a large gas turbine at Worsley in 1965 or 1966. This will likely be followed by a second turbine two or three years later. There is the possibility however, that other arrangements may be made before that time, because one alternative source of power might involve consideration of purchasing power from the proposed Portage Mountain plant near Hudson Hope on the Peace River. Once this is completed, there should be some cheap power available. If all of the power used in the Alberta portion of the Peace River country, however, were to be drawn from this source, it would amount to one-half of one percent of the output of that plant. The unit cost of transmitting this small amount of power will be high, so that it will probably have little effect in reducing the cost of power in that area. There has been some discussion about building an E.H.V. line to send power into the Edmonton area from Hudson Hope, but it is doubtful if this would be economical.

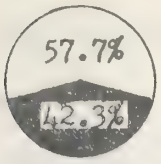
The Smoky river also appears to be a possibility for producing the power which is used in the Peace River country. Some preliminary studies have been made on this river. In general, it suffers from geological formations which slump in a manner similar to those along the Peace. It appears, however, that possibly 275,000 K.W. are available on it, but this project needs a great deal more study. Canadian Utilities are making further studies and, in the event that they are favourable, it might be possible as a start to develop one power site and to transmit the surplus power from this to the rest of the province.

Alberta is so richly endowed with energy resources from which we can

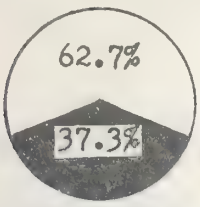
CHART NO. 3

KWH Generated 1942-1962
By Sources of Energy

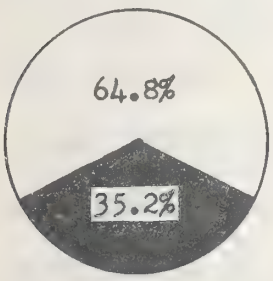




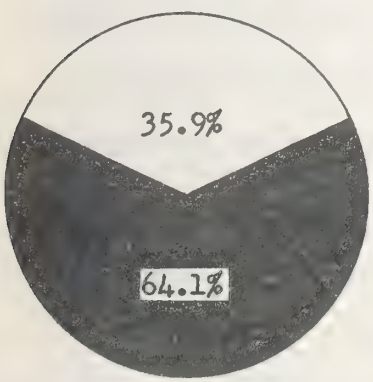
1942 - 418.7 KWH



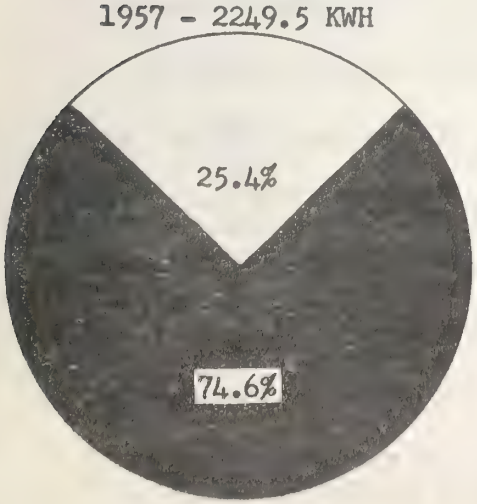
1947 - 641.3 KWH



1952 - 1174.0 KWH



1957 - 2249.5 KWH



1962 - 3768.4 KWH

produce cheap power that, costwise, except for local areas, imported power cannot compete. The power situation in the province is, fortunately, most flexible and it is quite possible that factors such as the development of the Hines Creek Iron Ore, the Smoky River coals, the further discovery of oil and gas, or the feasibility of some other source of power, or indeed, development of the oil sands, might change the picture. Alberta, with its oil, gas oil sands and coal, has some 80% of all Canada's known fossil fuels. Over 95% of the energy available in Canada from fuels is concentrated in oil sands and oil, gas and coal reserves of the three western Provinces and over four-fifths of this potential is in Alberta. The energy available from the oil sands is one and one-half times as great as all the rest of Alberta's fossil fuels combined.

By far the cheapest power in Alberta at the moment is that generated in the Wabamun steam plant. Two units there are using coal as fuel and future units will also do that. Using coal under the conditions present at Wabamun will produce power even more cheaply than by using natural gas.

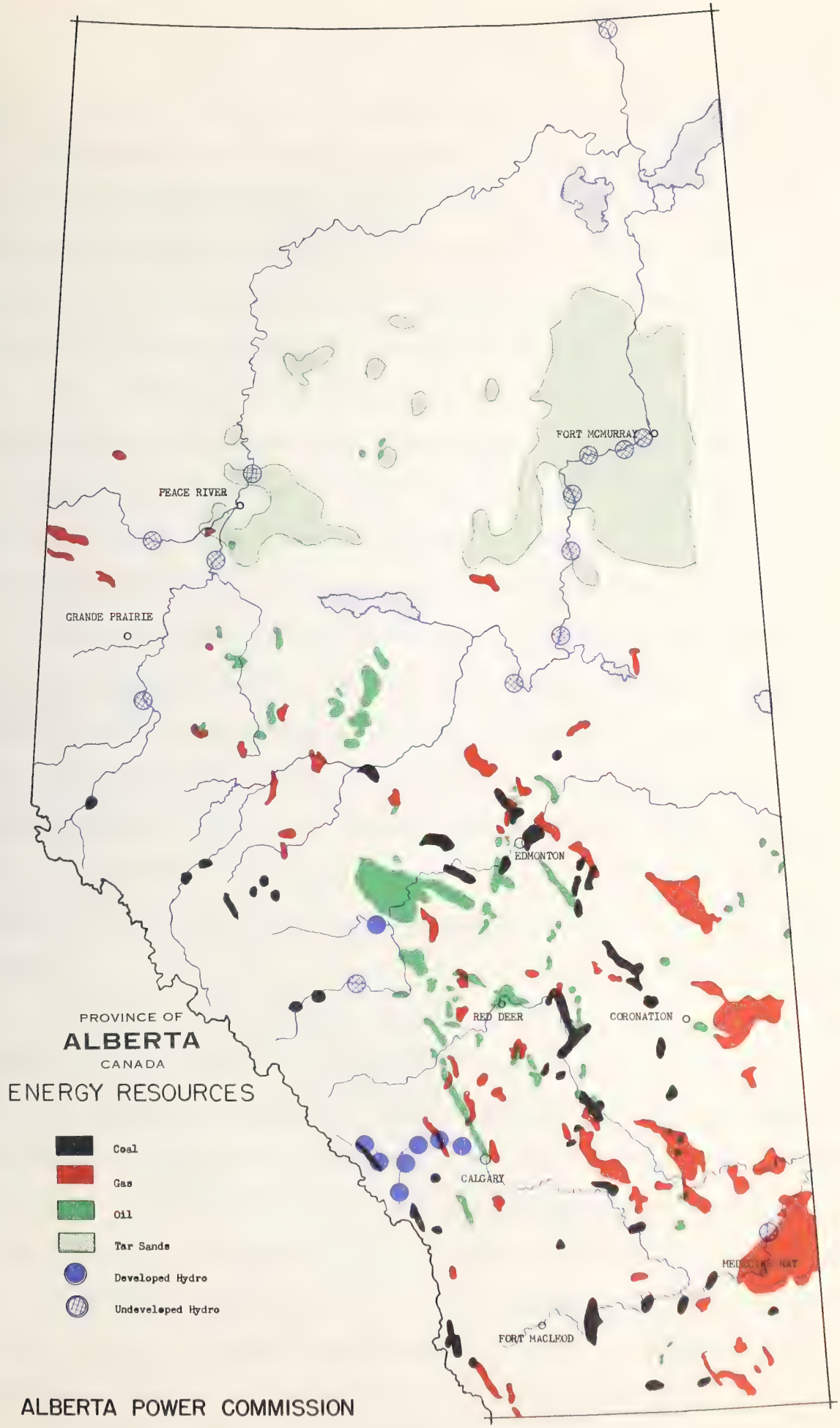
While Wabamun and future plants will use increasing amounts of coal and will thereby

increase Alberta's coal output, they will have little bearing on the conventional coal-mining industry. For some time in the future, coal for thermal power plants will be strip-mined. During a full year's operation, the Wabamun plant today uses something of the order of 1,000,000 tons of coal. Alberta's present output of coal for all purposes is slightly less than 3,000,000 tons. As new coal-fired plants are built, the output of coal will increase by leaps and bounds.

Such power plants require major coal fields to provide for their needs for 30 or 40 years. Only a relatively few areas have coal deposits which make them ideal for power generation requirements. An ideal field must have at least 100 million tons of coal which has an overburden of not more than 100 feet, and it must be located close to a large supply of cooling water.

As such fields get used up it will probably be necessary to use three or four smaller fields and to pipe the coal from them into a central power plant located on some body of cooling water. So far, moving coal by pipe line has not worked too well. The Research Council of Alberta, however, has been carrying on some studies that appear to hold prospects for the development of a feasible means of doing this. If these studies can be carried to a successful conclusion, possibly by means of a pilot plant, they will have a tremendous bearing on reviving the coal industry.

Because of the nature of Alberta's fuel resources, the ideal arrangement in the near future would be to generate some 90% of the K.W.H. needed in the Province in steam plants, leaving the remaining 10% to be generated by hydro plants. The peak load in the Province during 1963 was 938 M.W. Since the capacity to supply much of this load is only needed for such short intervals of time, the hydro plants, generally speaking, are well suited to perform this function. Hydro plants representing about 40% of the generating capacity of the Province would be required to carry the necessary portion of


FORT MCMURRAY
PEACE RIVER
GRANDE PRAIRIE
EDMONTON
RED DEER
CORONATION
CALGARY
FORT MACLEOD
PROVINCE OF
ALBERTA
CANADA
ENERGY RESOURCES
Coal
Gas
Oil
Tar Sands
Developed Hydro
Undeveloped Hydro
ALBERTA POWER COMMISSION

the peak load and, in doing so, would generate 10% or less of the K.W.H.

As compared to the rivers in Manitoba, Ontario and Quebec and those in British Columbia, the flow of our rivers does not lend itself to producing power which we need 24 hours a day and 365 days in the year. The reason is that nearly all the water comes rushing down from the mountains during May and June and then for the rest of the year the rivers are almost dry. Our greatest demand for power does not occur during these months of early summer, so our hydro plants and dams are built so as to store the summer water for use during the peak load periods of the winter. As our load grows to the point where huge storage projects will be economical, we may expect to see a move back to using some of our streams for base load.

There are several hydro sites which can be developed when more peaking power is needed and, indeed, some that might be used to carry base load for several years to come. Some of these are on the Bow River; other sites are on the Saskatchewan and Brazeau Rivers and the Athabasca River. The total hydro power potential of Northern Alberta exceeds 3,000,000 H.P., of which 2,000,000 H.P. is available on the Athabasca river below Smith. The remainder is on the Smoky, as mentioned above, and on the Slave and Peace rivers.

From recent studies made by the Alberta Power Commission and the Water Resources Branch, the Peace River presents some interesting possibilities. While the bridges at Dunvegan and Peace River Town are limiting factors on the River's possible power development, the upper portion of the river from the British Columbia border to a point some 150 miles below Peace River Town is interesting. Perhaps the most interesting section of the river is that from the British Columbia border to the Dunvegan bridge in which the river falls 110 feet. The lower valley banks in this reach appear to be in a geological formation which will probably be suitable enough for a dam.

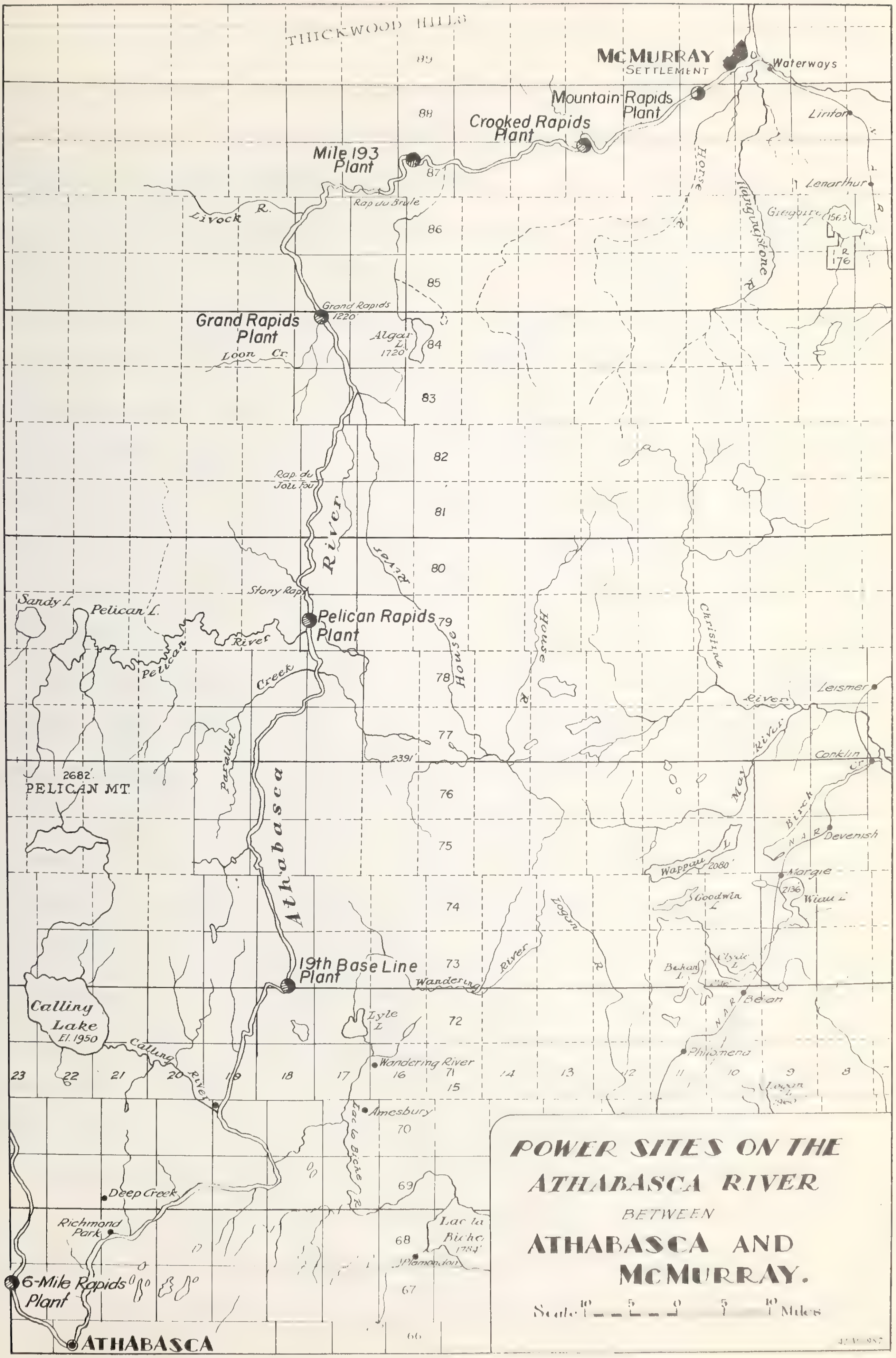
From the mouth of Burnt River to the mouth of the Smoky River the geological formation appears less stable and less suitable for a dam. It appears, however, that there are possible sites further downstream for some 150 river miles below Peace River Town. Beyond that, the stream and its valley increase in width while the banks get lower, all of which are factors that make that reach of the river of doubtful value for power purposes. Vermilion chutes do not appear to hold any power possibilities.

While the Power Commission's preliminary study of the Peace River has already produced the rough information given above, the study is only in the first stages. It is hoped that when it is finished we may have a much clearer idea of the power potential of the river. It is too early even to try to estimate the usable horse power which might be obtained from it.

The Athabasca river has been studied in considerable detail, as shown in the following table and accompanying map:

Power Sites on the Athabasca River below the mouth of the Pembina and above Fort MacMurray:

Site Name	Location	Installed Turbine Capacity, H.P.
Six Mile Rapids	Twp. 67-23-4	450,000
19th Baseline	Twp. 72-18-4	104,000
Pelican Rapids	Twp. 79-17-4	222,000
Grand Rapids	Twp. 84-17-4	378,000
Mile 193	Twp. 87-15-4	305,000
Crooked Rapids	Twp. 87-12-4	365,000
Mile 236	Twp. 88-10-4	223,000
		2,047,000
		(say, 2,000,000)



POWER SITES ON THE ATHABASCA RIVER

BETWEEN

ATHABASCA AND McMURRAY.

Scale 10 5 0 5 10 Miles

All of this power is within economical transmission distance of Edmonton and can be tied into the main transmission network, serving those areas of the Province which have heavy power requirements. The Six Mile Rapids site has been studied in some detail and, from an engineering standpoint, appears to be satisfactory. From the standpoint of the economics of the power business which is concerned with getting the cheapest power at any given time in the future, whether it be hydro or thermal, it appears that this site above Athabasca Town might be considered for development around 1972. It will be a rather spectacular development and quite a costly one and, for this reason, will not come into the realm of economic feasibility until the load in the Province is much more than it is today. In the meantime, the load can be supplied most economically by expansion of the Brazeau Dam and of the thermal plants.

The Big Bend hydro plant on the Brazeau is currently under construction. The power house, the first stage of which is now complete, is located 12 miles downstream from the main dam and storage reservoir.

Water from the Brazeau reservoir will reach the plant downstream by way of a canal. The outlet works at the upper end of the canal will include electrical and mechanical equipment associated with two turbine-pump units of 1,200 H.P. each. One of these units is now being installed in conjunction with the power plant downstream. When completed it will serve a double function, as a generator when the reservoir storage level is higher than the canal elevation, and as a pump when the reservoir is lower than the canal level, raising the stored water to the canal and thence to the power plant.

The Brazeau Dam, of course, was built primarily to increase the flow in the North Saskatchewan River during the winter months. There was an urgent and growing need to provide relief to the pollution problem which existed in that river below Edmonton during the low water period from October to April.

At the same time that hydro units are being installed it will be necessary, of course, to keep adding units in the thermal plants to carry the base load. While detailed plans for the next five years are included under the section headed "Forecast to 1968", reference can be made here to some of the units that are planned in the near future. The City of Edmonton will be installing another 72 M.W. gas-fired steam turbine during 1966. Beyond that, the city is considering the advisability of commencing a coal-fired steam plant on the Genesee coalfield. Canadian Utilities is studying the possibilities of a plant on the Smoky river and is also planning to complete the installation of another 32 M.W. steam turbine in its Battle River plant in 1964. The same year as was mentioned above, the first 150 M.W. unit of the Brazeau plant will come into operation. This will be followed by another unit of 190 M.W. at Brazeau in 1966. Then, by the fall of 1967, another larger, coal-fired unit will be installed in the Wabamun plant, depending upon load growth and other contingencies.

Unlike some other regions in Canada where the power authorities are forced to contemplate installing nuclear power, or to reach out hundreds of miles to bring in power from the hydro sites of the north, Alberta is abundantly supplied with sources of relatively cheap power. The problem is not one of searching for sites for power plants, either thermal or hydro, but is rather one of bringing into production whatever may be the most economical site at any given moment. The keynote of Alberta's planning, then, should be to make certain that, at any time, the next power plant to be built should be the one that will contribute the cheapest power to the excellent network of transmission lines which forms the backbone of the power system of the Province.

In the light of the rapidly rising cost of all commodities and services and of material and labour, the power producers and distributors have done a remarkable job in keeping the retail cost of power down. Electric power is

one of the very few commodities or services in Alberta which, instead of rising in cost, has fallen. While in many parts of Canada, rates for power have had to be increased, the private power companies have so far been able to stave off such an increase and much credit is due to them for their economical planning.

As shown by the map at the back of this report, the network of high voltage transmission lines is expanding in a co-ordinated fashion year by year. The major power producers, Calgary Power Ltd., the Cities of Edmonton, Lethbridge and Medicine Hat, Canadian Utilities Limited and Northland Utilities Limited are bringing about interconnections which have the effect of utilizing their generating equipment to its utmost efficiency, and this process will continue. During the past year, a major 240 K.V. transmission link has been built from Brazeau to the vicinity of Red Deer. One other similarly large section of line extending from Fort MacLeod east towards Medicine Hat was finished to complete the 138,000 volt system in the southeast corner of the province. In addition to these, there is the projected line to connect the Peace River country with the rest of the Province. By means of such major transmission lines, the Province is covered with a grid system. The Power Commission is continuing its study of future interconnection possibilities.

The Power Commission is also represented on the national working committee, which, for the last eighteen months, has been investigating the possibility of a trans-Canada grid. The studies involved are very complex and although good progress has been made so far, it is still too early to determine whether or not such a grid is feasible at the present time.

FORECAST TO 1968

At December 31, 1963, the capacity of the power plants in the Province was 1,137,000 K.W. At December 31, 1953 - ten years ago - this capacity was 372,000 K.W., so that the increase during the 10-year period has been over 200% - a very large increase. The K.W.H. generated in 1963 were three and one quarter times the amount generated ten years ago and showed an increase of 11% over the corresponding figure for 1962. Due to mild weather during 1962, the increase in peak load in 1963 was about 11%. If the weather had been the same in both years the increase in peak load would have been about 9%.

While a rate of increase of 11% in K.W.H. generated is high, we anticipate that the Province's electrical load will continue to grow at a slightly lesser rate for the next few years. The population of the Province is increasing, new industries are coming in and the prospects of more gas export are all factors that will keep Alberta's rate of electrical growth very high.

Table No. 21 shows the growth which we believe will take place in the electrical load of the Province from now until 1968. It shows the actual capacity in K.W. of the power plants in the Province as at December 31, 1962, the increase in capacity during 1963 and the estimated peak load that occurred in 1963. It then goes on to deal with these year by year until 1968, showing our forecast of peak load and what the Companies and Municipalities are planning to do to meet that load.

It appears that, if the present plans for additional units are carried out, we should have ample reserve capacity until 1968. It is hard to predict what the peak load will be five years from now. It will be noted from Table No. 21 that, while base load thermal units are planned, much of the emphasis over the next five years is going to be on peak load units.

TABLE NO. 21

Forecast of Net Generating Capacity in K.W.
(Not taking account of isolated small plants)

	Capacity added during year	Capacity at end of year	Estimated Peak Load
Capacity as at December 31, 1962		1,092,000	843,000
Capacity added during 1963			
City of Edmonton	72,000		
Northland Utilities Ltd. - Worsley	1,500		
Less adjustments revising figures to net	- 28,331		
	45,169	1,137,169	
		say, 1,137,000	937,500
Capacity to be added 1964			
Canadian Utilities Ltd. - Battle River	32,000		
Calgary Power Ltd. - Brazeau	150,000		
Total December 31, 1964	182,000	1,319,000	1,020,000
Capacity to be added 1965			
Nil			
Total December 31, 1965		1,319,000	1,110,000
Capacity to be added 1966			
City of Edmonton	72,000		
Calgary Power Ltd. - Brazeau	190,000		
Total December 31, 1966	262,000	1,581,000	1,200,000
Capacity to be added 1967			
Calgary Power Ltd. - Thermal	300,000		
Total December 31, 1967	300,000	1,881,000	1,320,000
Capacity to be added 1968			
Canadian Utilities Ltd. - Gas Turbine	30,000		
City of Lethbridge	30,000		
Total December 31, 1968	60,000	1,941,000	1,430,000

FARM ELECTRIFICATION

During 1963, 2,747 more farms were hooked up so that the total number of farms electrified as at the end of the year is 61,340. While, according to the 1961 census, Alberta had 73,212 farms which were being operated, only 65,816 of these were farms on which someone lived. The census included in this last figure 576 farms which were on Indian Reserves. Since 1,126 Indian homes are now receiving service under the Farm Electrification programme, this means that service is being given to about 550 Indian homes that, by the census definition, are not farms. Since the figure for farms hooked up at the end of 1963 was 61,340, it follows that, if we are to arrive at the number of census farms served, 550 should be deducted from this figure. After deducting this, we are left with 60,790 farms served as compared to the census figure of 65,816 on which someone lives, so that 92% of the farms in Alberta are served.

This percentage, however, is based on the number of farms shown by the census which was taken in the summer of 1961. In an effort to relate this to present day conditions, we have prepared the chart which follows and which illustrates the growth of Farm Electrification to December 31, 1963. It also forecasts the probable course of Farm Electrification during the next few years. The upper line shows both the number of farms being operated in the province and their numerical decline over the last decade. In projecting this decline forward from the last census, we estimate that, as at December 31, 1963, there are 71,000 farms being operated. Of these, there are 7,000 non-resident operators; that is, there are 7,000 farms that are being operated but on which no-one lives. Undoubtedly, the operator lives in a nearby town.

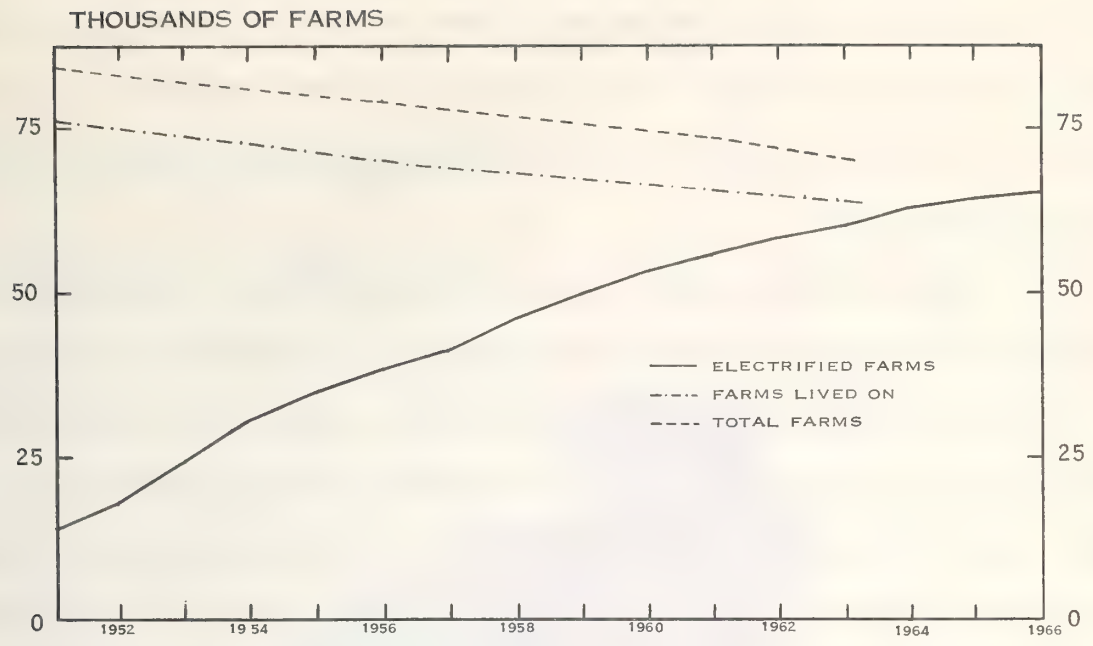


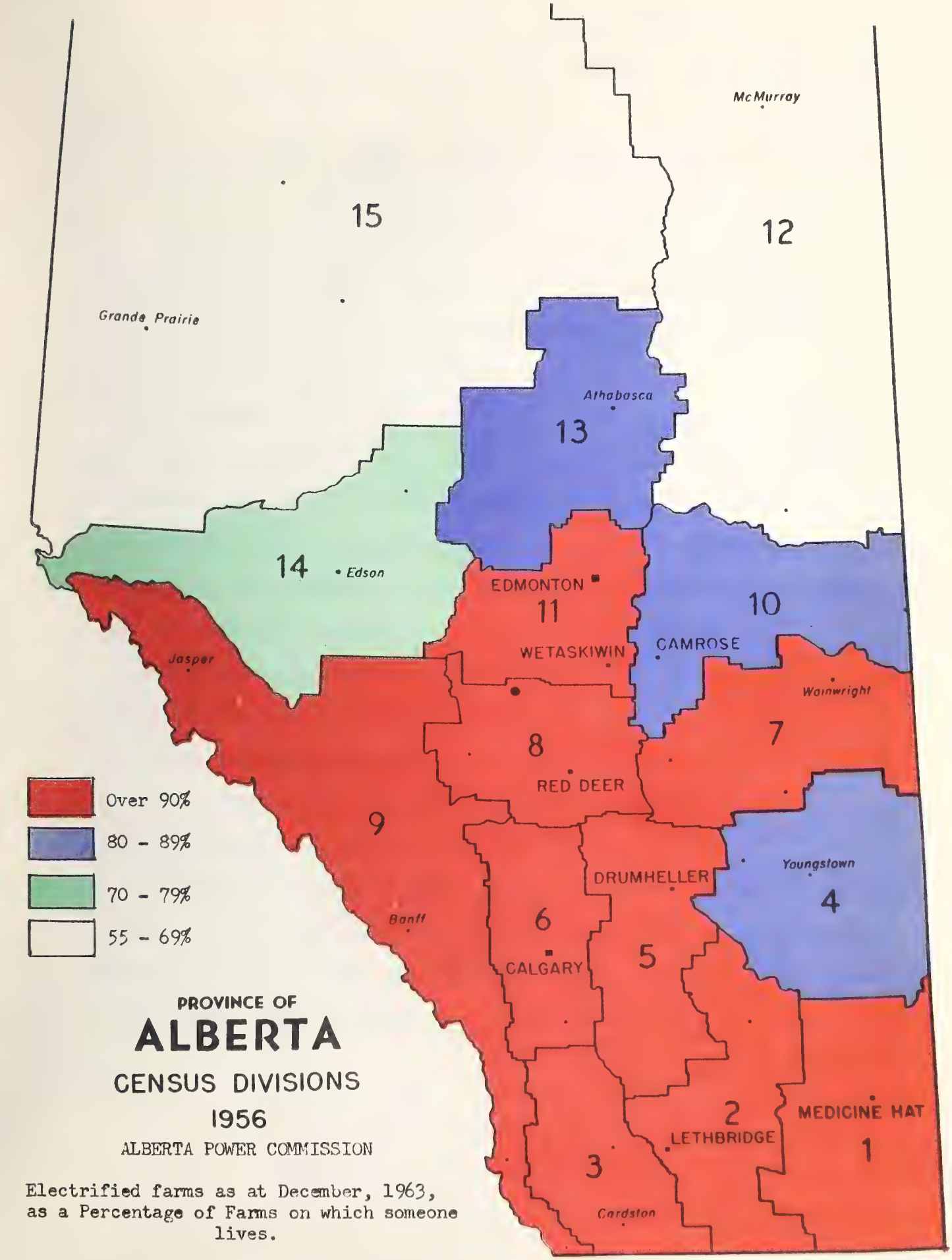
CHART NO. 4. Total Farms, Farms on which someone actually lives, and electrified farms in Alberta, 1951 - 1966. (estimated for 1963 - 1966 inclusive)

The chart also shows the number of farms that have been connected over the years. Although, naturally, the rate of increase is slowing up each year, the number of electrified farms continues to increase. We estimate that this number will increase as shown. Based on this estimate, we expect to hook up 2,000, 1,500, and 1,000 farms during 1964, 1965 and 1966 respectively. By the end of 1964 there will be more farms electrified than the total number of farms on which someone lives. This is already true in Census Divisions 2, 3, 5, 6 and 8. There are a number of reasons for this. 1. The first lies in the definition of a farm. For Farm Electrification purposes we class a customer as a farmer if, in the opinion of the R.E.A. in question, he is a farmer. While most R.E.A.s use the Dominion Bureau of Statistics' definition as set out in the 1961 census as a guide, the R.E.A.'s opinion may not always coincide with that of the D.B.S. As a matter of fact, the D.B.S. definition has changed since the 1956 census. Undoubtedly some farms are served which are not classed as such by the census.

2. On the other hand, there are many farms as defined by the census which are still not electrified. For instance, in census divisions 12, 14 and 15 there are about 1,560, 260, and 2,480 farms still not served. We will refer to that later.

3. The consolidation of farms also affects the figures. Many farms have changed hands since they became electrified. We estimate that the turnover in farms since 1950 has been over 25%, that is, 25% of the farmers now being served are not the original contract holders on the land they farm. In many cases this is due to consolidation of farms where someone whose place is already electrified has bought another quarter which had power installed on it and the power on this second quarter is not now in use. There are about 2,500 such unused services, that is, somewhat less than 5% of the total services originally connected are not now being used. Wherever it is possible these unused services are dismantled and the material used at some other location. However, many purchasers of electrified farms on which they are not going to live wish to retain this service for pumping water or for some other purpose.

The solid line on the chart shows the number of farms on which transformers are installed but, as stated above, at the end of the year some 2,500 of these were not in use. As will be seen, we have projected the solid line forward for three years to show the increase we expect in the number of electrified farms to 1966. This increase will take place mainly in census divisions 12, 14 and 15 because it is in these areas where the saturation of farm electrification is still low. The network of lines has been established in these areas and nearly all of the farmers not yet hooked up are adjacent to existing lines and the remainder, perhaps 10% of the farmers not taking service, are not more than a mile away from the power line. Now that TV reception is available in nearly all parts of the province, everyone's desire


McMurray
15
12
Grande Prairie
Athabasca
13
14
Edson
EDMONTON
11
10
WETASKIWIN
CAMROSE
Jasper
Wainwright
8
7
RED DEER
9
DRUMHELLER
Youngstown
4
Banff
6
5
CALGARY
2
MEDICINE HAT
LETHBRIDGE
1
3
Cardston
Over 90%
80 - 89%
70 - 79%
55 - 69%
PROVINCE OF
ALBERTA
CENSUS DIVISIONS
1956
ALBERTA POWER COMMISSION
Electrified farms as at December, 1963, as a Percentage of Farms on which someone lives.

to enjoy its pleasures will soon induce the remainder of the farmers to hook up.

The only exception to this is those farmers who, during the last year or so, have taken up homesteads in some of the outlying parts of census division 15. In many cases they have settled in remote areas and in some cases their residence on the land is transitory. While the number of such farmers is really not large, the problem of carrying power to these remote, scattered and sparsely settled ones is a difficult one.

The following table shows the number of farms connected as of December 31, 1963. It also shows the number of non-farm customers served off farm lines.

While there are 61,340 farmers connected, farm electrification also served 9,428 non-farm customers who would not have obtained service otherwise. The total number benefitting by the construction of these farm electrification lines is, therefore, 70,768.

At the end of December, 1963, there were 43,688 miles of farm lines and, during the year, 1,209 miles had been constructed.

It is interesting to compare these figures with a recent report appearing in the July, 1963, issue of Electrical Digest. This report deals with rural electrification in Ontario and is as follows:

"Ontario Hydro passed a significant milestone in its rural electrification program this spring by gaining its 500,000th rural customer. More than 97 per cent of the rural population has been supplied with electricity, including 138,000 farms. They are supplied by 48,500 miles of rural distribution line."

TABLE NO. 22

Combined figures for Alberta

Farm Electrification as at December 31, 1963.

	No. Farms Connected	Non-Farms	Hamlet Customers	Total Non-Farm Customers	Total Served off Farm Lines
Experimental Areas	3,380	752	506	1,258	4,638
Completed R.E.A.s	55,766	3,779	4,391	8,170	63,936
Individual Rurals	1,940	—	—	—	1,940
Farms supplied by Cities	254	—	—	—	254
Total Actually Served	61,340	4,531	4,897	9,428	70,768

Financing

At the end of December there was a total of 374 active Rural Electrification Associations. These Associations have borrowed under the Guarantee Act, the Revolving Fund Act and the Long Term Financing Act, and the total of all of these borrowings for new construction has been approximately $46,385,000.00. At December 31, 1963, over $26,660,000.00 of this had been paid back. The investment in all rural lines in the Province is approximately $56,000,000.00.

By the end of 1963, the Power Commission had given approval to 3,705 applications for loans under Part I of the Revolving Fund Act or under the Long Term Financing Act. While all of this money had not been borrowed by the end of December, the approvals covered 38,315 farms at an estimated cost of $44,301,000.00.

During 1963, the Power Commission gave approval to applications for loans under Part I of the Revolving Fund Act or under the Long Term Financing Act for an amount of $2,771,989.00 to give service to 2,206 farms. Of this amount, $2,707,439.00 was loaned where no Part II loan was necessary. Of the 2,206 farmers signing contracts under the Revolving Fund Act or under the Long Term Financing Act in 1963, 39 of them were in areas that needed the assistance of Part II loans. In such areas, Part I loans totalling $64,550.00 were approved in conjunction with Part II loans totalling $33,882.00. The framework of lines in these new Part II areas will make it possible for an additional 100 farmers to connect to them whenever they are ready.

Since the inception of Part II loans, an amount of $1,887,501.00 has been approved. As at December 31, 1963, $1,451,782.20 of this has been paid back, almost $376,700.00 remains outstanding, and the remainder was never borrowed. Out of a total of 300 Part II loans which have been issued to date,

158 have been repaid in full and a great many more are nearly paid off.

The existence of Part II loans made a very definite contribution to farm electrification and made it possible to build a framework of lines in areas which otherwise would have had great difficulty obtaining service. There were 9,447 farmers in these areas and initially 3,872 of them took advantage of this financial assistance to get their lines built. In most R.E.A.s, once the lines were built, many of the remainder of the farms hooked on to them within two or three years so that great strides have been made in repaying these Part II loans. As stated, during 1963 Part II loans totalling $33,882.00 were approved and we expect that during subsequent years this amount will decrease year by year.

Checking Costs

During the year, the Commission has checked all the cost statements which the Companies have rendered to R.E.A.s, showing the costs of building their lines. In addition to this, some field checks have been made on various farm areas. With very minor exceptions, these costs have always been found to be correct. These checks further show that the areas have been constructed at cost. The Power Companies are building these areas at cost and, from an engineering standpoint, they are building them efficiently.

The question of the correctness of operating charges made to farmers is constantly under study. We believe that the Power Companies are doing a remarkable job of keeping these costs down and of accounting to the farmers for them. In all the years to date, the actual costs have been less than the monthly charges made to the farmer in his power bill, so that, at the end of each year the Power Companies have been able to make a refund to the deposit reserves of the Associations. The operating charges made in Alberta appear

to be reasonable and compare very favourably with those made by R.E.A.s who are operating in similar territory in the United States. One of the advantages gained by our farmers which enables these charges to be kept low is the rather unique method of operating R.E.A.s in Alberta. While in the United States the R.E.A.s are generally larger than they are in Alberta, each R.E.A. there maintains its own supervisory, office and operating staff, with the result that its overhead is apt to be high. In Alberta, where the expenses of operating R.E.A. lines are pooled over all the farmers being served by any one power company and where, for instance, Canadian Utilities Limited does the operating for nearly 14,600 farms and Farm Electric Services Limited does this work for some 37,800 farms, the overhead from a number of small offices is not added to operating expenses. In other words, these companies operate the farm lines and do the billing and accounting more efficiently than would be the case if this were being done separately by a number of small R.E.A.s. Unfortunately, the utmost efficiency in operating these lines is not enough to keep pace with the inflationary rise in material and labour costs. As the lines get older, more petty maintenance is becoming necessary and this adds to operating expenses. Increases in cost are gradually narrowing the spread between the actual costs and the nominal operating charge.

The Power Commission feels that it is its duty, not only to investigate problems brought to it, but also to investigate any phases of farm electrification which it believes require study. While the building of farm lines appears very simple and the operation of them is taken for granted, nevertheless, there are many intricate problems to be considered if we are to keep all expenses down to the very minimum. Many questions such as accumulation, investment and use of deposit reserves, monthly versus quarterly billing, card meter reading and operating charge per foot of line, all merit careful and

continuous study. As each of these problems is solved, a new one arises to take its place. In its engineering and accounting aspects, farm electrification is highly technical and the individual R.E.A. does not have the time nor the opportunity to investigate these matters. The Power Commission feels that one of its main responsibilities is to see that consideration is given to every factor that could possibly reduce the cost of electricity to the farmers.

During the past twenty years as has been mentioned above, the number of farms being operated in Alberta has been decreasing rapidly although in recent years the rate of decrease is not so marked. In 1951 there were 84,315 such farms in Alberta; by 1961 the number had been reduced to 73,212. It appears likely that by 1981 this number will be further reduced to, possibly, 57,000. On the other hand, the size of farms has been increasing. Whereas the total acreage per farm in 1951 was 525, by 1961 it had increased to 645 acres. Projecting this trend into the future would indicate that the average size of a farm might be of the order of 900 acres by 1981. These changes will be most obvious in grain and mixed farms.

Today, some 88% of the electrified farms in the Province use a 3 K.V.A. transformer. As agricultural production becomes more intensive as indicated above, the percentage of larger transformers will increase. While this percentage increase is likely to be nearly all confined to the irrigated areas and to the areas within a radius of, possibly 50 miles of our cities, it poses some problems in the design and operation of farm electrification lines. As the load per farm increases, the size of substation transformers will also have to increase and it will become necessary in some R.E.A.s to increase the wire size on the feeders leading out from the substation. It may be necessary in some cases to change some miles of the feeder lines over to 3-phase.

Indeed, there are some farmers at the moment whose operations are large enough that they might welcome a 3-phase installation in their yard.

Now that the construction phase of farm electrification is pretty well over, the importance of other operating and maintenance problems increases. Some R.E.A.s are now over 15 years old, that is, their poles, etc. have reached half their life. In these R.E.A.s the wisdom of having set up a deposit reserve and the necessity of the reserve are becoming evident. While the reserve is primarily intended to provide a sum of money to replace the poles when they come to the end of their life, two other uses for which the reserve was designed are becoming more manifest.

The first comes about as a result of the decreasing number of farms and the consolidation of farms. At the present time there are approximately 2,500 services which were used by bona fide farmers when they were first constructed but which are now not in use because the land has been consolidated with some other land already having power on it or for some other reason.

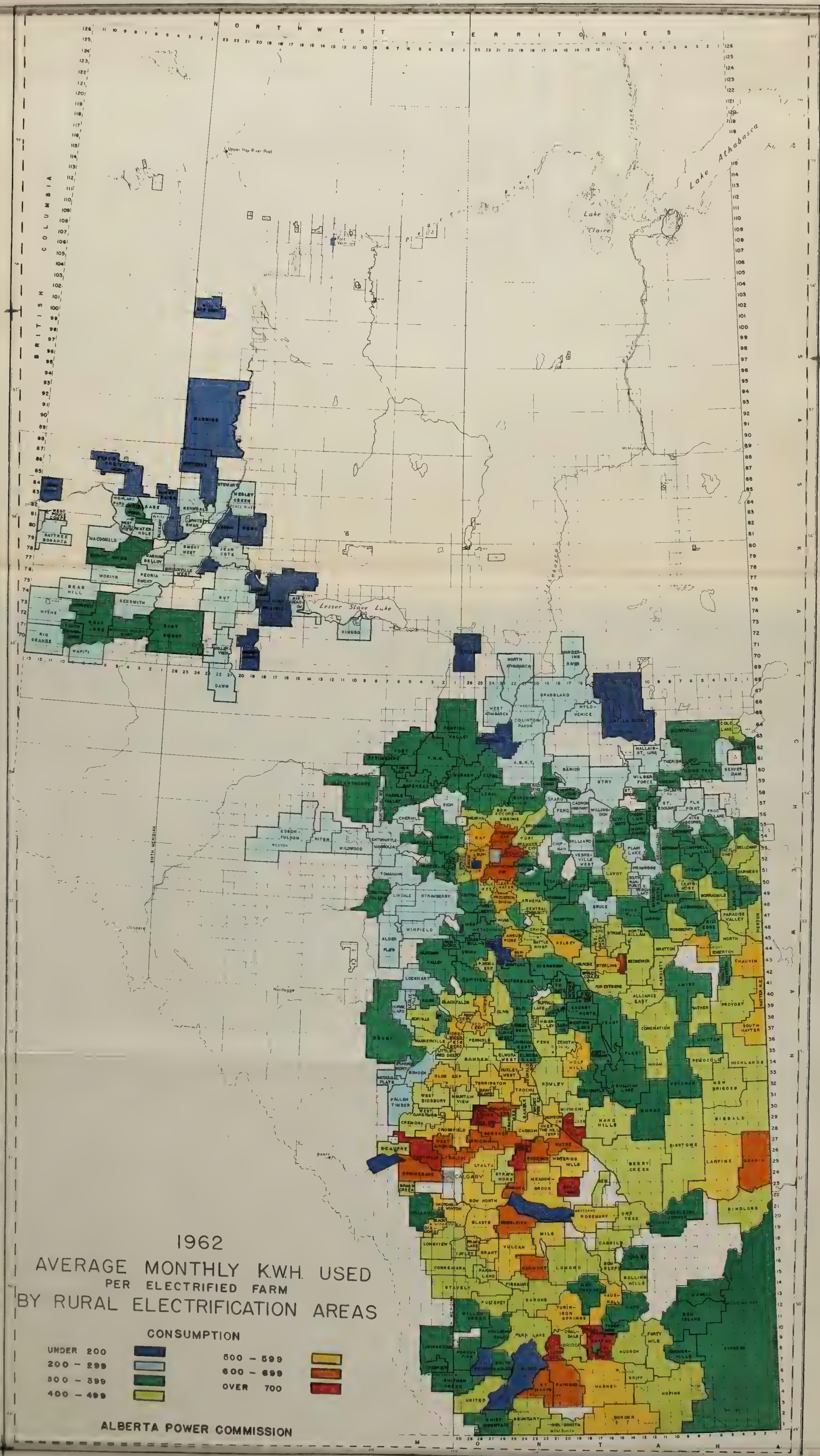
Once all of the farms within the boundaries of an R.E.A. have taken service, the number of active members in that R.E.A. reaches a maximum. From then on the number will start to decline. In some areas this decline may not take place because people from the cities will move out of small acreages which have enough aspects of a farm to be classed as a farm for electrification purposes. In most of the areas, however, this decline will become evident. As more and more services are disconnected, the miles of line per remaining farm will increase. At the same time, the burden of maintaining the R.E.A.s' total mileage will fall more heavily upon the farms that remain. This is not an alarming tendency because, as the farms get bigger we may expect them to become more efficient and their operators more wealthy and thus capable of keeping up their farm electrification system. This is not a phenomenon

peculiar to farm electrification, but is paralleled in the case of mutual telephone lines and other rural community services.

The decrease in the number of farms and the increase in the size of farms brings with it an increased consumption of power per farm. Even though the number of farms were to remain steady, the consumption would continue to increase, but its effect is more marked as farms get larger and this is the second of the factors affecting deposit reserve. During 1963, the average Alberta farm used 4,953 K.W.H. This is nearly double the power used per farm ten years ago. It is above the average for all Canada, less than that for Manitoba, but higher than farm consumption in Saskatchewan. While farm consumption has almost doubled during the past decade, the K.W.H. generated per capita during the same period more than than doubled.

With this rapid increase in consumption goes an increase in the demand placed upon the R.E.A.s' lines and substations. When the original systems for the R.E.A.s were built they were designed for an average anticipated load of about 300 K.W.H. per month. Since that time the consumption has grown until now the average is over 400 K.W.H. per month and in some R.E.A.s it is over 700 K.W.H. per month. There was no way of telling in the beginning what consumptions would develop in the area and there was no point in over-building the systems at that time. However, provision was made in the deposit reserve that, as the consumption increased, money would be available to take care of the need for increased capacity in R.E.A.s which turned out to have a large consumption.

The map which follows shows the average monthly K.W.H. consumption by R.E.A.s during 1962. In general, the lowest consumptions are found in those areas within census divisions 12, 14 and 15. This is partly due to the fact that most of these R.E.A.s were somewhat late in getting organized and since then have been very slow in approaching saturation. There are still


1962
AVERAGE MONTHLY K.W.H. USED
PER ELECTRIFIED FARM
BY RURAL ELECTRIFICATION AREAS
CONSUMPTION
UNDER 200
200 – 299
300 – 399
400 – 499
500 – 599
600 – 699
OVER 700
ALBERTA POWER COMMISSION
NORTHWEST TERRITORIES
BRITISH COLUMBIA
SASKATCHEWAN
MONTANA
Lesser Slave Lake
Lake Athabasca
Lake Claire
SIXTH MERIDIAN
CALGARY

large number of new customers being added in these areas each year and, since new customers do not use much power in the beginning, the addition of these customers tends to dilute the effect of the higher consumption by the older farmers in the area. The areas of high concentration are the Milk Shed areas around Edmonton and Calgary. It appears that the consumption of power is closely related to the size and type of farm with the larger farm having a larger power consumption. The size and type of farms is itself largely dependent on the type of soil in the area. The large wheat-growing farms and the ranches in the south are, generally speaking, heavy consumers, while the smaller quarter section-type mixed farms tend to have a small consumption. This is probably a result of higher net income which is reflected in the purchase of more energy-consuming devices.

Deposit Reserves

The Power Commission has been making a careful study of the adequacy of the deposit reserves being set aside by the R.E.A.s. Some of the older lines of the first R.E.A.s are now at the midpoint of their useful life. In general, it appears that most deposit reserves will be adequate, but there will undoubtedly be some R.E.A.s in which, because of their high mileage of line per farm, it may be desirable to increase the annual accrual. While the Power Commission has developed a method by which it can assess the adequacy of existing deposit reserves, many assumptions have had to be made. Some of these will prove to have been too optimistic or pessimistic but it is expected that the errors will compensate each other. If experience should prove any of these assumptions to be badly out of line, our annual review will catch this trend before it has gone too far.

After rather intensive studies for two or three years now, it appears

that very few R.E.A.s find themselves with too much money in their deposit reserve. From time to time the Power Commission has had the opportunity of discussing this problem with the directors of various R.E.A.s, and we believe that, as a result, more and more R.E.A.s are beginning to see the necessity of this reserve.

Several R.E.A.s in the province have reserves that appear to be building too rapidly and these have been advised that money is available in their reserves which they can refund to their members. At one time it was thought that in the case of an R.E.A. whose reserves had reached this point it could discontinue the monthly payments to the reserve for a year or two. After discussing this with the Union of R.E.A.s and with the Power Companies it has seemed advisable not to discontinue the monthly charge but to continue making this charge and make a cash refund of the amount in excess of the estimated requirement. On the other hand, if the deposit reserve appears to be clearly inadequate, the Power Commission could recommend to the R.E.A. that the monthly payment be increased. In this way, the position of the deposit reserve would be reviewed and revised periodically and any necessary adjustments could be discussed with the R.E.A. and the Power Companies.

The average K.W.H. used per farmer in Alberta today is 4953 K.W.H. per year. This is higher than the national average and much higher than anyone could have foreseen ten years ago. This high use of power, while it is an indication of the value of farm electrification to Alberta farmers, is making it necessary to increase the size of substation transformers and, in some cases, to increase wire size on some feeders. Provision was made in the deposit reserve to allow for this and in those areas experiencing the heaviest use, this work is being done and is charged to the reserve. While the original lines were designed for what at the time was considered a high use, it was obviously impractical and too costly to build the lines to a heavier

standard then. Doing so would have meant that the original farmers would have had to carry a uselessly high investment for many years.

It is becoming apparent that in some R.E.A.s the poles already need considerable treatment and even some stubbing. While inspection and the pole treatment should be charged into the operating account, we believe that the material used for the stubbing should be paid for out of the deposit reserve account, because this is, in effect, adding value to the existing line.

We look upon the money being paid into the deposit reserve by any farmer in any one year as his share of the depreciation that takes place during that year that he is using the line. Since the beginning of farm electrification in the Province, over 25% of farms have changed hands and, if we look down the road another 25 years most of the farms will have changed hands either by the original farmer selling out or by giving his farm to his son, etc. When he sells the farm he sells it at a price that will also pay the cost of the power line. If we take a farmer who has had power for 15 years, say, he sells the power line for at least what it cost him originally and leaves in the deposit reserve the money that he has paid year by year. The new man buys the farm and the power line on this basis. He can see that the power line has depreciated considerably but is willing to pay the full price for it because he knows that in the deposit reserve there is enough money to take care of this depreciation. Theoretically, what he has paid for is a piece of depreciated power line, plus enough deposit reserve to make it as good as ever. In his turn, he continues to make monthly payments to the deposit reserve until, when the day comes that the line is worn out, there is enough money to rebuild it.

The end result to the farmer who sold the line is that when he sold out he got back his original investment and has merely paid deposit reserve for the number of years he has used the line.

Peak Load

The annual use of electricity per farmer in Alberta during 1963 has been 4953 K.W.H. In the aggregate, the electricity consumed by farmers accounted for slightly more than 6 % of the total power generated in the Province. While the farmers use only 6 % of the K.W.H., however they are responsible for 13% of the peak load. The percentage which the farmers will use of the K.W.H. generated in the Province is never likely to exceed 7% of the total output.

But the total K.W.H. that the farmers use is not so significant as the peak load they impose on the generating and transmission facilities. The estimated combined peak load used for farm electrification is 125,000 K.W. This 125,000 K.W. is a large proportion of total plant capacity and consequently means that a large proportion of the companies' investment in plants and transmission lines is reserved solely for farmers. The companies' investment in this equipment, which is reserved solely for the farmers' use, will be well over $600.00 for each farm served.

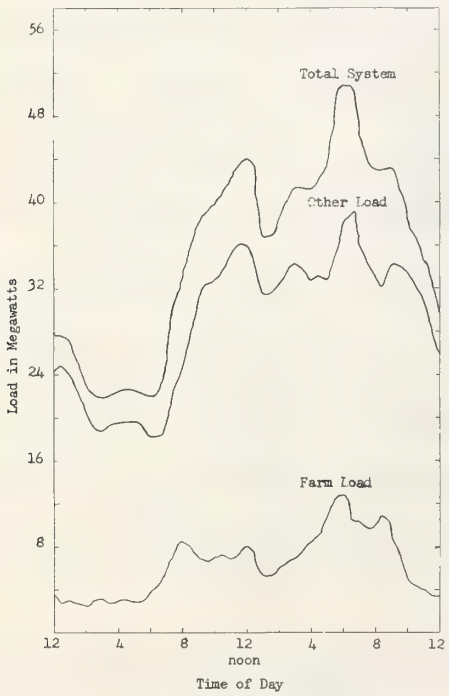


CHART NO. 5 Typical Load Curves for a December Day. Canadian Utilities Ltd.' System.

The accompanying chart was prepared from Canadian Utilities' figures and shows the load on that Company's system, hour by hour, for a day. The lower line shows the load imposed on the system by farms, the central line shows the load emanating from the rest of the Company's system and the top line shows these two added together to produce the Company's total load. It will be seen that the peak load originating in farms comes on at the same time as the peak load upon the rest of the system.

The average farmer's electric load factor is very low and is something of the order of 27% as compared to a Province-wide load factor of about 50%. This question of load factor is an important one and, while it confronts many industries, it bears most heavily on the gas and electric utilities. The highest electric peak load of the year usually happens just before Christmas and may have a total duration of only an hour or so on two or three different days at that time of the year. The power companies have to install enough generating capacity to meet that peak even though for the remainder of the year all of this capacity is not used.

Once the generating capacity is installed and this is particularly so of hydro plants, the cost of operating it 24 hours a day is not such a great deal more than the cost of operating it one hour a day. In other words, the cost of generating 24 K.W.H. per day with one K.W. of equipment is not much more than generating one K.W.H. per day with one K.W. of equipment. This being the case, any customer such as a paper mill in the East, for instance, which can use a fairly constant amount of power for 24 hours a day for 365 days a year can obtain this power very cheaply. Such a customer has a load factor of nearly 100%. An example of a customer at the other end of the scale would be a community hall used for only a few nights during the winter and therefore having a load factor of possibly 1%. The average load factor placed upon the plants in Alberta is about 50%, that is, on the average the generators produce only one-half of what they could if the load was such that they could run steadily for 24 hours a day.

The 61,340 farms in the Province with their load factor of 27%, fall far below this average of 50%. Some 125,000 K.W. of generating equipment has to be reserved solely for their use over the peak load period, but for the year as a whole it is only used 27% as much as it could be.

In order to improve their load factor, farmers would not only have to

use more electricity than they do now, but would have to arrange their farming operations so as to use the extra power at an off-peak period. This matter has been discussed with the Union of R.E.A.s. As a result, the Power Commission, Farm Electric Services Ltd., and Canadian Utilities Ltd. made surveys of some farm loads to see what might be done to encourage more off-peak use of power. The studies, which extended over a couple of years, were somewhat frustrating. It appeared that some farmers, by planning their work, could operate some of their energy-consuming devices off peak, and thus improve their load factor. Since the cost of electricity is, on the average, only 0.8% of total farm operating expenses, it is not too practical to expect such careful planning in the use of power. While it is probably not possible to make major changes in farming practice in the use of electricity, nevertheless, this does present an avenue which would lead to reduced power bills so long as all farmers were to work toward that end. It is a subject towards which farmers might direct some thought, in the hope of improving their load factor.

As a result of the studies and of the discussions between the Power Companies, the Union of R.E.A.s and the Power Commission, the Companies agreed to work out an incentive-type rate which, in a general way, it is hoped will accomplish the same end as that sought by the installation of relays.

The new monthly energy rates for all three Companies within the southern interconnected system are as follows, depending on the transformer size:

	Transformer size in K.V.A.			
	3 and 5	7½	10	15
K.W.H. @ 2¢	400	800	1,200	1,700
Excess @ 1.5@				

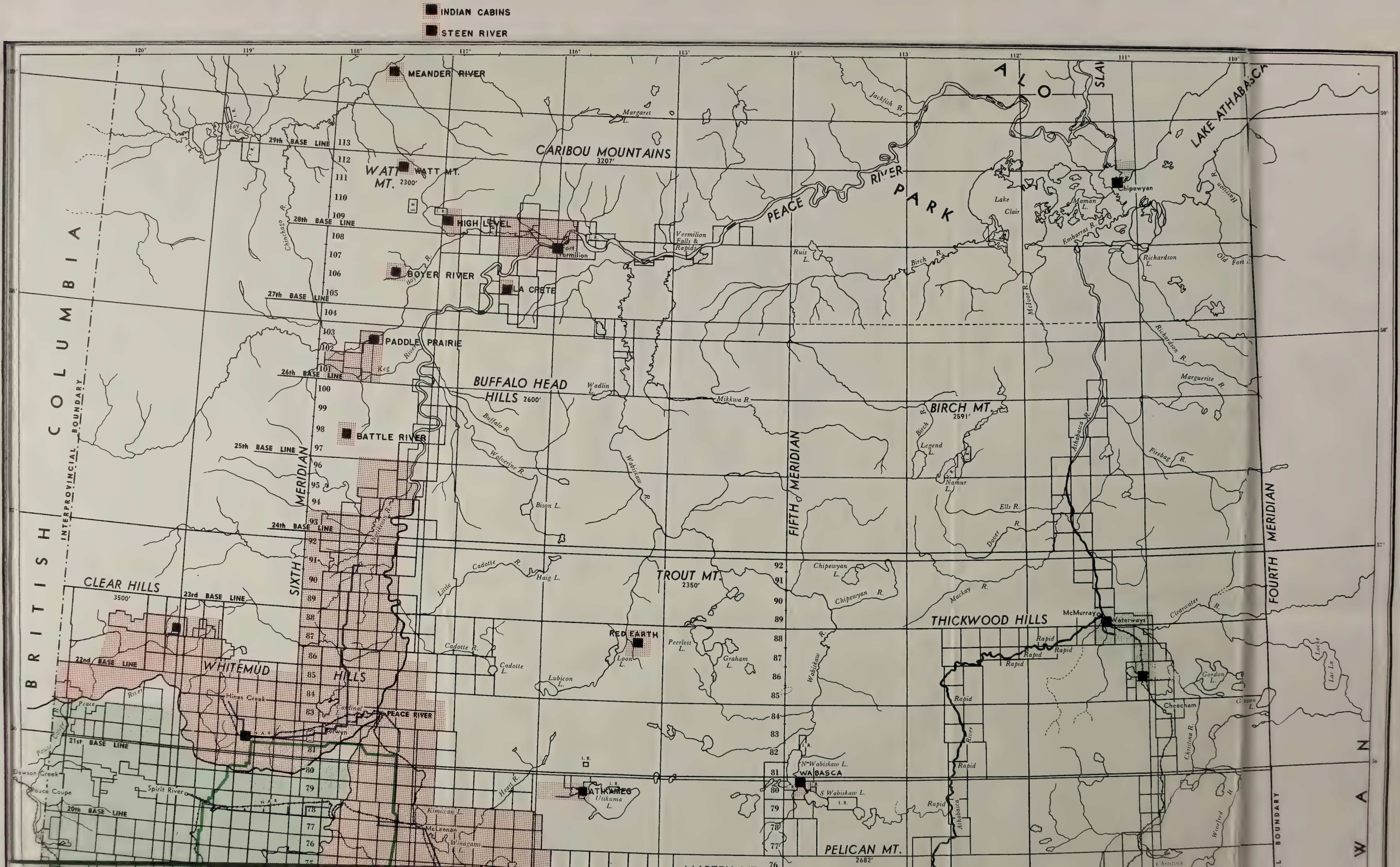
By the southern interconnected system we mean all that area generally south of the Athabasca River served by Northland Utilities Ltd.,

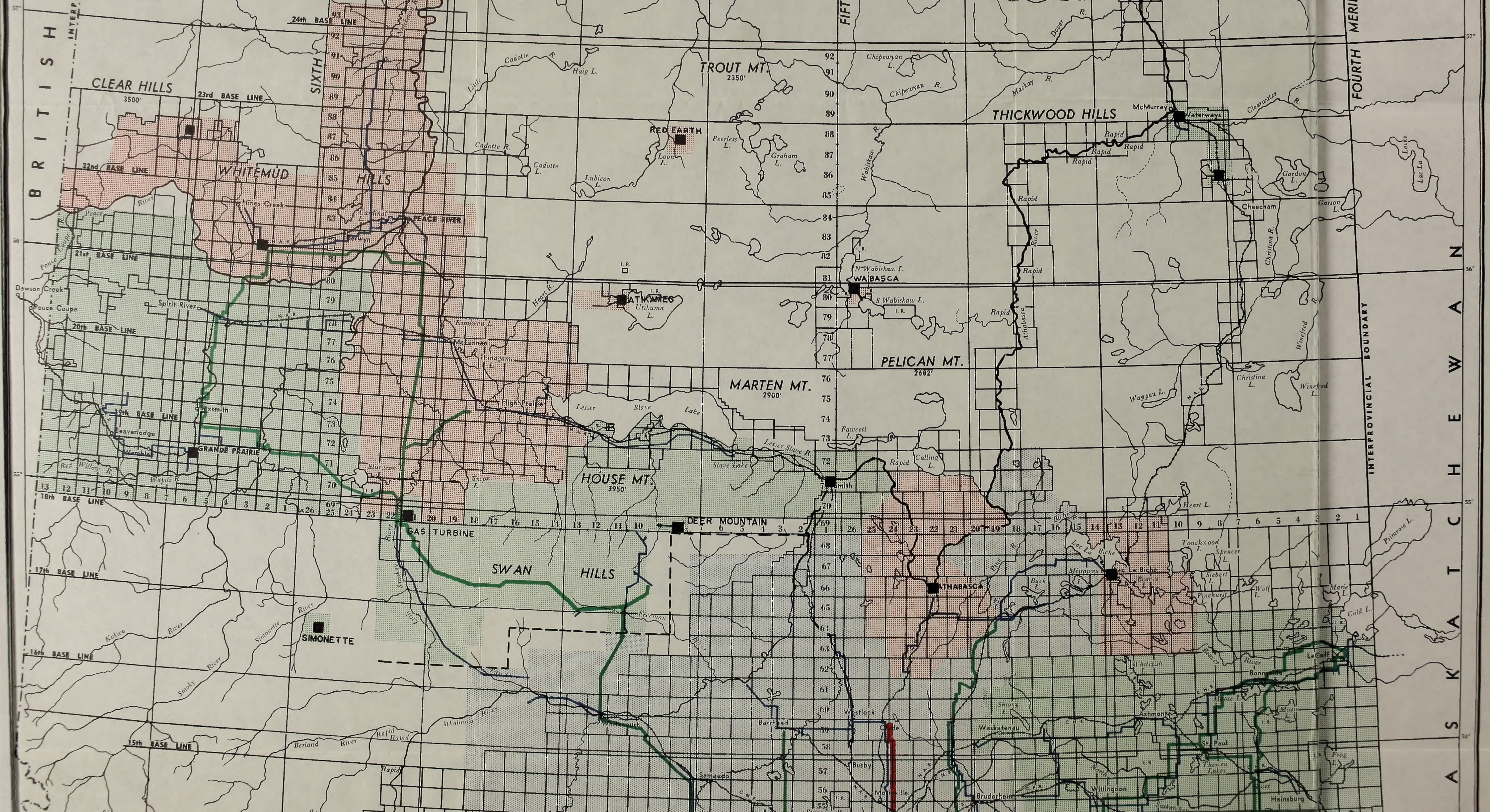
Canadian Utilities Ltd., and Calgary Power Ltd., except the Smith R.E.A., which is served by an isolated plant.

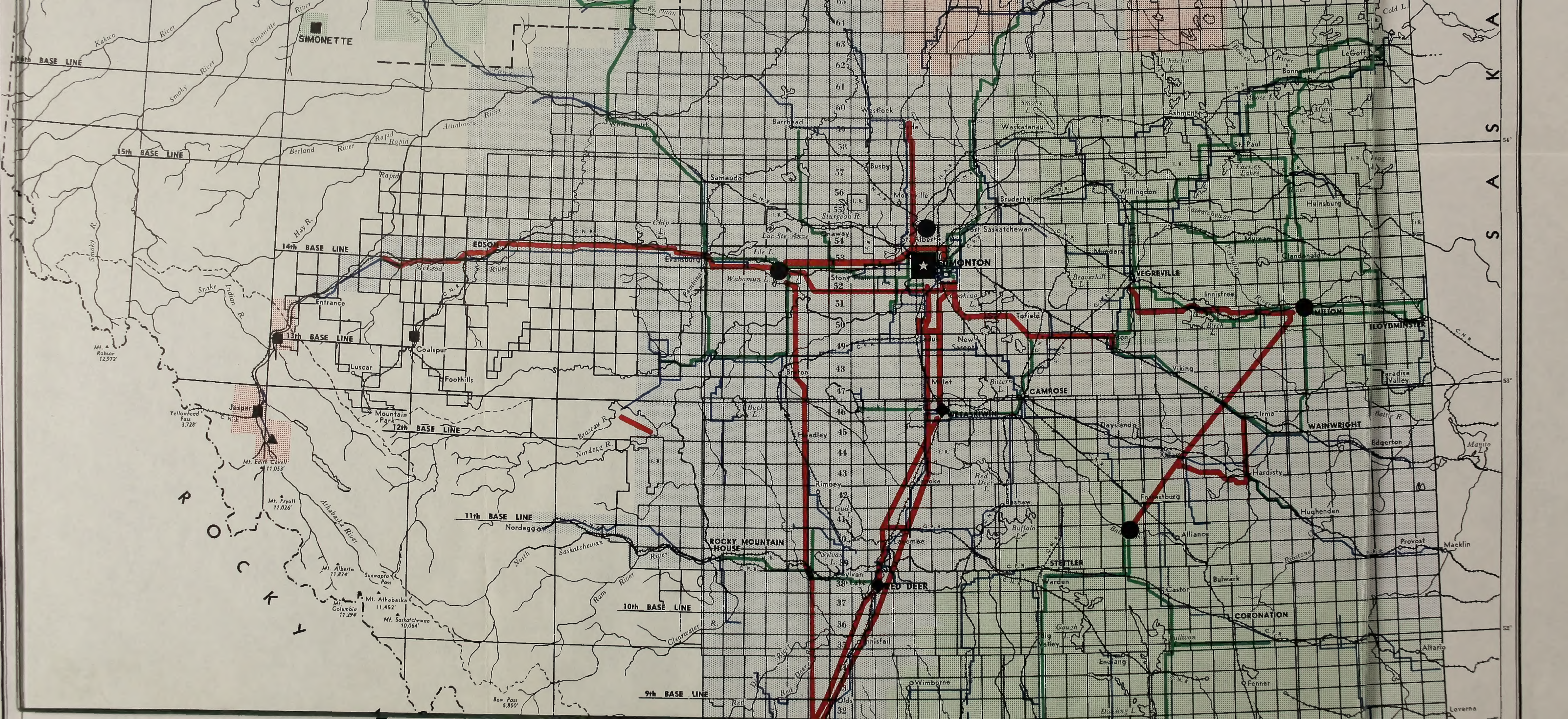
In the main part of the Peace River country, served by the interconnected system, including also the Smith R.E.A., the rates are as follows:

	Transformer size in K.V.A.			
	3 and 5	7½	10	15
K.W.H. @ 2.2¢	400	800	1,200	1,700
Excess @ 1.7¢				

Rate reductions introduced January 1, 1963, on energy sold to farmers has appreciably lowered the cost of power for many farmers in the Province. The period of operation has been too short to accurately assess the effects of the new rates but it appears that about 40% of the farmers in the south of the Province and about 25% of those in the north have been eligible to receive 1½¢ per K.W.H. power. For those participating in this change there was an average saving of about 15% in the energy portion of their monthly power bill. As well as this, there was an additional saving by reason of lowering the first step of the rate in the Peace River country.


INDIAN CABINS
STEEN RIVER
MEANDER RIVER
BRITISH COLUMBIA
INTERPROVINCIAL BOUNDARY
CARIBOU MOUNTAINS
3207'
WATT MT.
2300'
29th BASE LINE
28th BASE LINE
27th BASE LINE
26th BASE LINE
25th BASE LINE
24th BASE LINE
23rd BASE LINE
22nd BASE LINE
21st BASE LINE
20th BASE LINE
HIGH LEVEL
Fort Vermilion
Vermilion Falls & Rapids
BOYER RIVER
LA CRETE
PADDLE PRAIRIE
BUFFALO HEAD HILLS
2600'
BATTLE RIVER
PEACE RIVER
PARK
LAKE ATHABASCA
Lake Claire
Chipewyan
Mamawi L.
Embarras R.
Richardson L.
Old Fort
Jackfish R.
Margaret L.
Chinchaga R.
Boyer R.
Keg River
Wadlin L.
Mikkwa R.
Buffalo R.
Wolverine R.
Bison L.
Ruis L.
Birch R.
McIvor R.
Richardson R.
Marguerite R.
BIRCH MT.
2591'
Legend L.
Namur L.
Firebag R.
Ells R.
Dover R.
Athabasca R.
SIXTH MERIDIAN
FIFTH MERIDIAN
FOURTH MERIDIAN
Wabiskaw R.
Cadotte R.
Haig L.
Little
TROUT MT.
2350'
Chipewyan L.
Chipewyan R.
Mackay R.
THICKWOOD HILLS
McMurray
Waterways
Clearwater R.
CLEAR HILLS
3500'
WHITEMUD HILLS
RED EARTH
Peerless L.
Graham L.
Loon L.
Cadotte L.
Lubicon L.
Rapid
Gordon L.
Cheecham
Christina R.
Gipsy L.
Hines Creek
Berwyn
Dawson Creek
Pouce Coupe
Spirit River
N.A.R.
N W Wabiskaw L.
WABASCA
S Wabiskaw L.
Heart R.
ATIKAMEG
Utikuma L.
Kimiwan L.
McLennan
Winagami L.
PELICAN MT.
2682'
Winefred R.
Christina


BRITISH
SIXTH
FIFTH
FOURTH MERIDIAN
SASKATCHEWAN
INTERPROVINCIAL BOUNDARY
24th BASE LINE
23rd BASE LINE
22nd BASE LINE
21st BASE LINE
20th BASE LINE
19th BASE LINE
18th BASE LINE
17th BASE LINE
16th BASE LINE
15th BASE LINE
CLEAR HILLS
3500'
WHITEMUD
HILLS
TROUT MT.
2350'
THICKWOOD HILLS
RED EARTH
PEACE RIVER
McMurray
Waterways
Cheecham
WABASCA
ATIKAMEG
Utikuma L.
McLennan
High Prairie
MARTEN MT.
2900'
PELICAN MT.
2682'
Lesser Slave Lake
HOUSE MT.
3950'
Smith
GRANDE PRAIRIE
Dawson Creek
Pouce Coupe
Spirit River
Sexsmith
Beaverlodge
GAS TURBINE
DEER MOUNTAIN
SWAN HILLS
ATHABASCA
Lac La Biche
SIMONETTE
Westlock
Barrhead
Busby
Waskatenau
Ashmont
St Paul
Bonnyville
LeGoff
Heinsburg
Willingdon
Bruderheim
Sangudo
Cadotte L.
Lubicon L.
Loon L.
Peerless L.
Graham L.
Chipewyan L.
Gordon L.
Garson L.
Christina L.
Winefred L.
Wappau L.
Calling L.
Fawcett L.
Heart L.
Primrose L.
Cold L.
Touchwood L.
Spencer L.
Siebert L.
Pinehurst L.
Wolf L.
Marie L.
Frog L.
Whitefish L.
Theresa Lakes
Sturgeon L.
Swan L.
Kakwa River
Smoky River
Simonette River
Berland River
Athabasca River
Wabiskaw R.
Clearwater R.
Christina R.
Cadotte R.
Little R.
Mackay R.
Dover R.
Chipewyan R.
Heart R.
Wapiti R.
Red Willow R.
Beaver River


SIMONETTE
15th BASE LINE
14th BASE LINE
13th BASE LINE
12th BASE LINE
11th BASE LINE
10th BASE LINE
9th BASE LINE
EDSON
Entrance
Coalspur
Luscar
Foothills
Jasper
Mountain Park
Yellowhead Pass 3,728'
Mt. Robson 12,972'
Mt. Edith Cavell 11,053'
Mt. Fryatt 11,026'
Mt. Alberta 11,874'
Sunwapta Pass
Mt. Athabaska 11,452'
Mt. Columbia 11,294'
Mt. Saskatchewan 10,064'
Bow Pass 5,800'
ROCKY
Nordegg
ROCKY MOUNTAIN HOUSE
Evansburg
Wabamun L.
Barrhead
Westlock
Busby
Morinville
Bruderheim
Fort Saskatchewan
Tofield
VEGREVILLE
Mundare
Innisfree
Willingdon
Waskatenau
Ashmont
St Paul
Heinsburg
LeGoff
LLOYDMINSTER
CAMROSE
Viking
Irma
WAINWRIGHT
Edgerton
Daysland
Hardisty
Forestburg
Alliance
Hughenden
Provost
Macklin
STETTLER
Castor
Bulwark
CORONATION
Innisfail
Wimborne
Olds
S A S K

ALBERTA

PROVINCE OF
ALBERTA
CANADA

ALBERTA POWER COMMISSION
MAP OF
TRANSMISSION LINES
IN
PROVINCE OF ALBERTA

19 Scale: 1 Inch = 20 Miles 63

20 0 20 40 60

LEGEND

TRANSMISSION LINES 132 K.V. & OVER
" " 33 K.V. TO 72 K.V.
" " UNDER 33 K.V.

POWER PLANTS - STEAM
- HYDRO
- INTERNAL COMBUSTION

SERVICE AREA
CALGARY POWER
CANADIAN UTILITIES
NORTHLAND UTILITIES

ROCKY MOUNTAINS

INTERNATIONAL BOUNDARY

MONTANA

EAST KOOTENAY POWER CO.

COMPILED AND DRAWN IN THE TECHNICAL DIVISION, DEPARTMENT OF LANDS AND FORESTS, EDMONTON, ALBERTA